ENGINEERING AND MINING JOURNAL

A McGRAW-HILL PUBLICATION

MARCH 1954

PRICE FIFTY CENTS

FOUNDED 1866

DEBATE: Charles Taft vs Andrew Fletcher on world trade and mineral policies ..... p 72

IRON ORE PLANT: How newest beneficiation plant departs from previous practice ..... p 78

ALUMINUM AS FUEL: How it's used today — How it may be used tomorrow ..... p 84

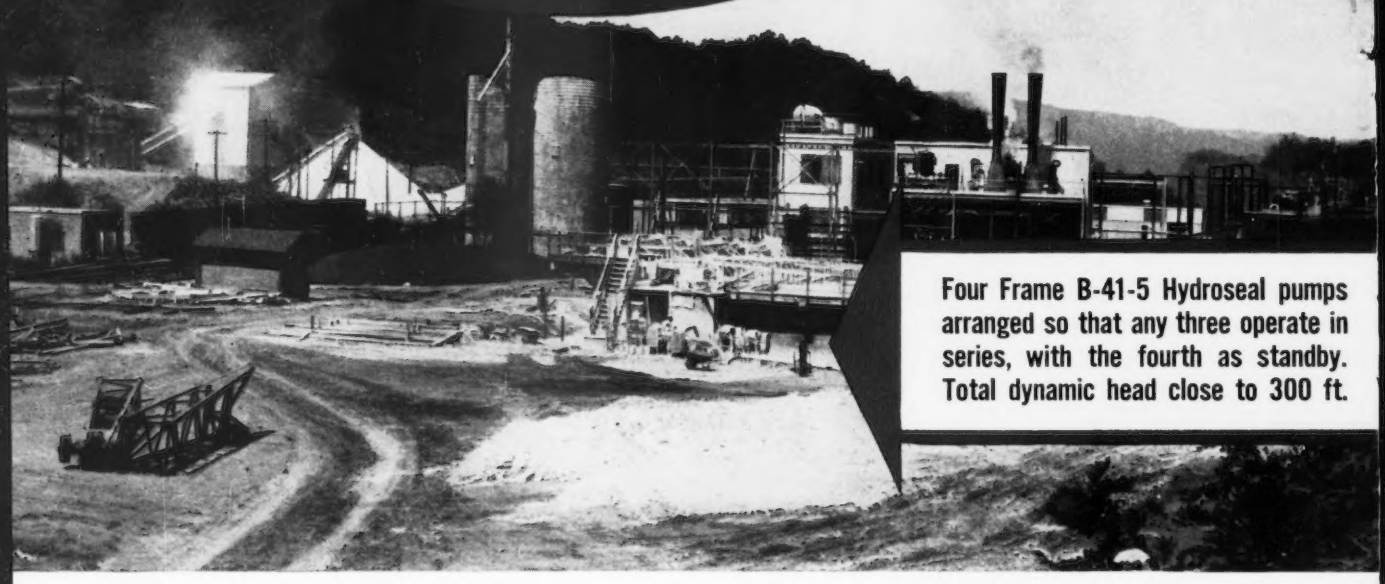
MINING PRACTICE: Part II of E&MJ's annual survey of mining throughout the world ..... p 87

USSR MECHANIZATION: Kounrad copper mine illustrates Soviet idea of mechanization ..... p 95

DIAMOND BITS: How the manufacturer can help you get lower diamond drilling costs ..... p 96

MEXICAN INVESTMENT: What you ought to know before you put your money into Mexican mining ..... p 98

World's largest lithium chemical plant pumps tailings with HYDROSEALS

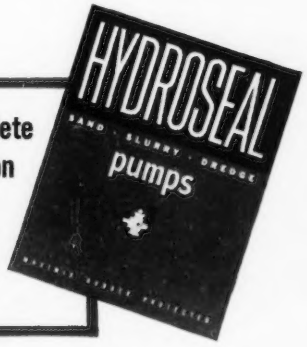


Four Frame B-41-5 Hydroseal pumps arranged so that any three operate in series, with the fourth as standby. Total dynamic head close to 300 ft.

FOOTE MINERAL COMPANY'S new lithium chemical plant at Sunbright, Va., where this lightest metallic element is compounded by a new process for chemical use in such diverse fields as the manufacture of multi-purpose lubricating greases, ceramics and alkaline-type electric storage batteries. Integrated with mining operation at Kings Mountain, N. C. (Hydroseal pumps also), Foote processing at Sunbright enjoys control of all basic raw materials.

Maximum head and ability to work in series make Hydroseals the favorites of operators. Their power savings and long life . . . with maintained initial efficiency . . . make them indispensable to long-range budgeting.

For complete information write for Catalog No. 953

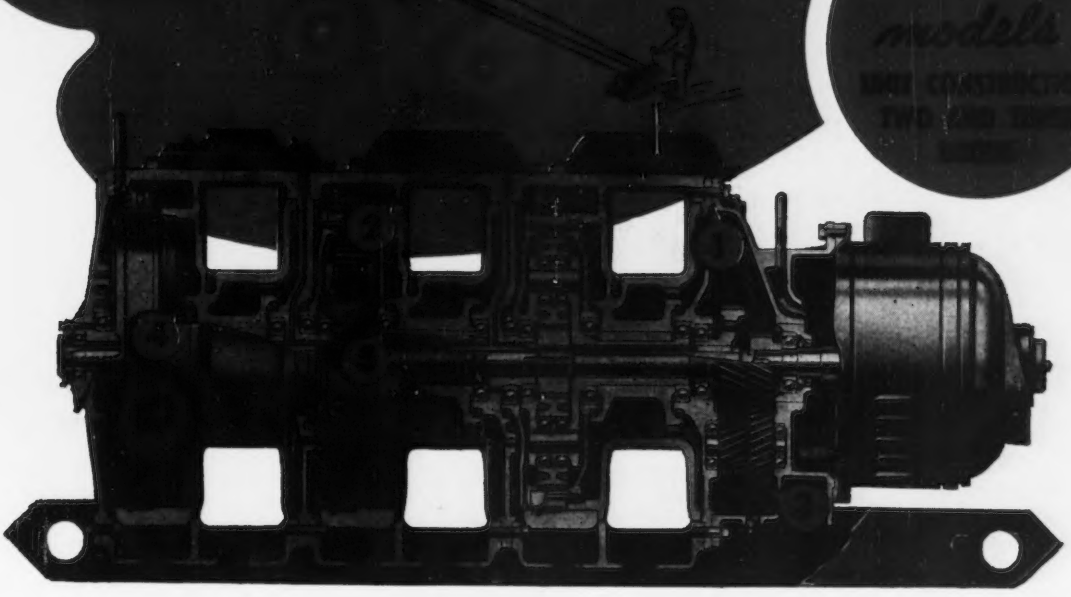


THE ALLEN-SHERMAN-HOFF PUMP CO.
Dept. B—259 E. Lancaster Ave., Wynnewood, Pa.
Representatives throughout the World

HYDROSEAL and CENTRISEAL
SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

move your materials with

Ingersoll-Rand Scraper Hoists



AIR AND ELECTRIC DRIVE . . . up to 60 Horse Power

look at these features:

1. The flange mounted motor, counterbores, shoulder fits and rigid barrel-type housing maintain accurate and permanent alignment.
2. Close fits between the rope drum flanges and the housing prevents the rope from jumping the flanges.
3. The quiet, smooth-running, helical, stub tooth gears are made of special heat-treated steel and operate in a bath of grease.
4. High quality seals prevent the loss of grease and the entrance of dirt from all gearing.
5. All rotating parts are supported on ball bearings reducing friction, conserving power and insuring long life.
6. Each drum is equipped with rope guides to prevent excessive wear on the wire rope, individual finger tip clutch control, and external easily accessible clutch adjusting screw.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 829-16

COMPRESSORS • ROCK DRILLS • AIR TOOLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES

ENGINEERING AND MINING JOURNAL

88th YEAR OF PUBLICATION

VOL. 155 NO. 3

MARCH 1954

FEATURE ARTICLES

Editorial 71

Taft Vs Fletcher
Foreign Trade Must Be Increased ..... C. P. Taft 72
More—Not Less—Domestic Production . A. Fletcher 73

Modern Plant Will Treat Mesabi Lean Ores
E. C. Herkenhoff 78

The Role of Aluminum As a Special Fuel
G. M. Babcock and F. S. Rethwisch 84

Survey of Mining Practice, Part II .... A. H. Hubbell 87

USSR Claims Full Mechanization at Mine 95

Cooperation with Bit Maker Cuts Diamond Costs
A. H. Lense and Ned Miles 96

What Chance Has Foreign Capital in Mexico?
C. W. Wright 98

REGULAR DEPARTMENTS

New Products Digest 35
Outlook 67
Markets 68
Behind the By-Lines . 70
Washington Impact 100
Personals 108
Operating Ideas 118
This Month in Mining 120

Alfred M. Staehle .... Publisher

Robert H. Ramsey ..... Editor

Alvin W. Knoerr, Managing Editor
George P. Lutjen, Associate Editor
John B. Huttl, Associate Editor, San Francisco
F. Alvin Zimmerli, Assistant Editor, Layout
Hans H. Wanders, Market Editor
George H. Cleaver, Assistant Editor, Markets
Daniel P. Eigo, Copy Editor
John H. Kearney, News Editor
George J. Young, Consultant
McGraw-Hill Washington Bureau
Morton A. Reichek, Natural Resources
Alan E. Adams, Labor

Carl Coash, Advertising Sales Manager

Published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860-1948), Founder.

Publication Office, 1309 Noble St., Philadelphia 23, Pa. Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 West 42nd St., New York 36, N. Y. Donald C. McGraw, President; Willard Chevalier, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Nelson Bond, Vice President and Director of Advertising; J. E. Blackburn, Jr., Vice President and Director of Circulation.

Subscriptions: Address correspondence to Engineering and Mining Journal—Subscription Service, 1309 Noble St., Philadelphia 23, Pa., or 330 West 42nd St., New York 36, N.Y. Allow one month for change of address.

Subscriptions are solicited only from management, production and maintenance executives and engineers in the metal and nonmetallic mining and refining industry. Position and company connection must be indicated on subscription orders.

Branch Offices and District Managers: Atlanta 3, R. H. Sidur; Chicago 11, F. W. Boots, G. A. Mack; Cleveland 15, W. M. Spears; Dallas 1, J. H. Cash; Los Angeles 17, C. W. Dysinger; New York 36, T. E. Alcorn, John B. Lewis; Pittsburgh 22, H. C. Chellson; Philadelphia 3, W. A. Potter; St. Louis 8, F. W. Roets; San Francisco 4, J. W. Otterson; Washington 4, D. C. London address: McGraw-Hill Publishing Co., Ltd., McGraw-Hill House, 95 Farringdon Street, London E. C. 4, England. Cable address: McGrawHill, London.

News Bureaus: Atlanta 3; Cleveland 15; Detroit 26; Houston 25; San Francisco 4; Washington 4.

World News Offices: London, Frankfurt, Manila, Mexico City, Paris, Sao Paulo, Tokyo.

Price of this issue, 50c. Subscription rates: United States and possessions, $3 a year, $4 for 2 years, $5 for 3 years. Canada, $5 a year, $8 for 2 years, $10 for 3 years. Other Western Hemisphere, $8 a year, $12 for 2 years, $16 for 3 years. Elsewhere, $15 a year, $25 for 2 years, $30 for 3 years.

Please indicate position and company connection in all subscription orders.

Entered as second class matter May 24, 1951, at the Post Office at Philadelphia, Pa. under the Act of March 3, 1879.

Copyright 1954 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Printed in U.S.A.

LETTERS

Extrasensory Perception?

SIR:

Most every engineer who has been around Mexico has heard of the crazy Frenchman who worked for years running a tunnel into an apparently barren mountain. He wasn't so crazy, though, because he hit one of the richest silver orebodies ever found in Mexico. . . and hit it just about where he said he would find it. He was crazy like a fox, but what made him this way?

All successful mining engineers who have brought in good mines have a secret feeling that they possess some power over and above their technical knowledge, but it would be a sacrilege (and mean excommunication from the profession) to admit it.

If some prominent engineer were to state that he *knew* a certain mine was good, not only because he had compiled conclusive evidence, but that he had also suffered from a special type of headache or fever or some other ailment while making the examination, he would immediately be classed as having rocks in his head.

(Yet) in parts of South China the writer visited a number of small mining areas in which the most important man was the mining doctor, not on account of a higher degree from some university, but for the simple reason that he cured sick mines. Each doctor had his own method for . . . finding the continuations of lost orebodies. Some diagnosed the illness through the study of chicken entrails, others through the study of the heavens. Certainly any engineer, if he does possess any such powers, will not admit it . . . (but) what makes a successful mine engineer tick?

If some special powers are possessed by a selected few, how can they be detected, and are we overlooking a bet by not trying to find out?

GEORGE T. SCHOLEY
A. Soriano y Cia.
Manila, P.I.

South African Policy

SIR:

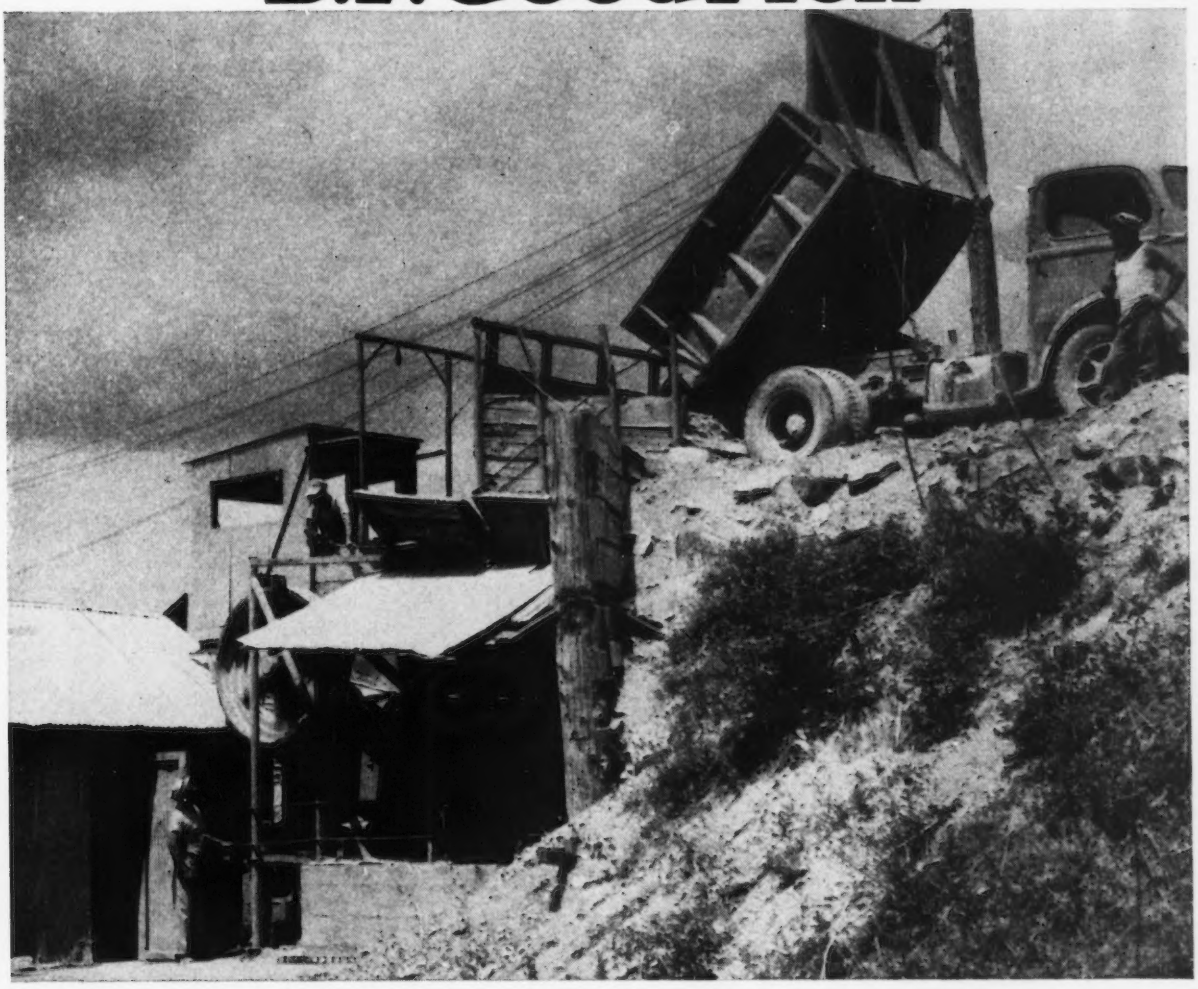
Your (October 1953) journal contained an excellent article entitled "Sound Policies That Can Help South Africa's New Gold Mines."

With knowledge to overcome the technological difficulties of heat, ventilation and the like, all that seems necessary to assure further development . . . is a rational attitude by the government on royalties and taxes. (With these) there is no reason why the South African mining industry (and the Union) cannot enjoy a long period of prosperity.

This article is the best account (I have read on the subject) and I hope you will induce the anonymous author to contribute more papers.

WILLIAM WALLACE MEIN
San Francisco, Calif.

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Again! Longer life, greater savings with Grommet V belts

Rock company saves 3 ways with B. F. Goodrich V belts

ROCKS by the truckload are dumped in that crusher, and reduced to the right size for highway construction. But the jolting action is rough on the V belts that run the crusher. Ordinary belts suffered from shock loads, wore out fast. Time outs for belt replacements brought the whole plant to a standstill.

When the company told a B. F. Goodrich man about the trouble, he recommended a switch to Grommet V belts. The belts you see here had been at work three years when the picture was taken without any shutdowns whatever for maintenance.

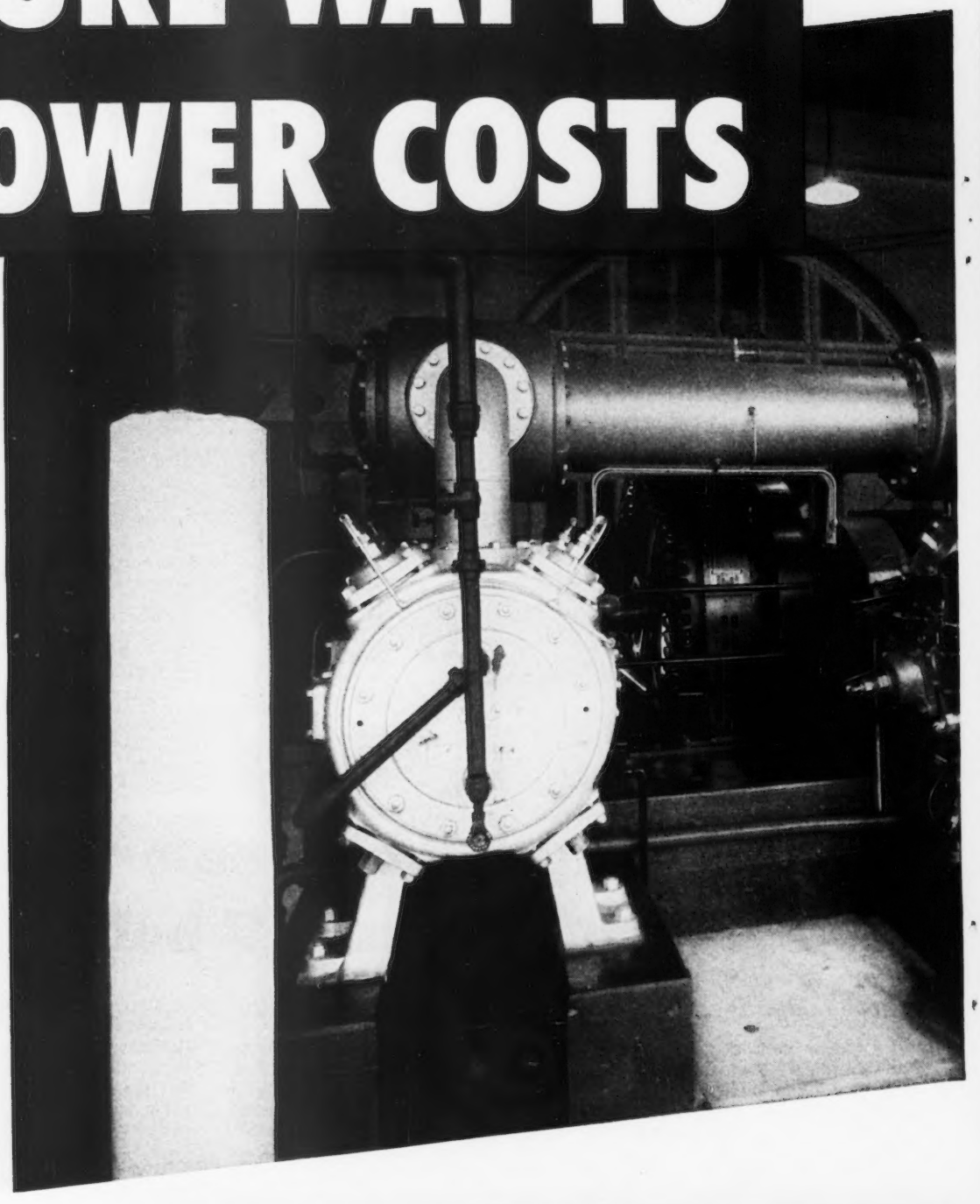
No wonder B. F. Goodrich Grommet belts outlast and outperform ordinary belts. In Grommet belts, all the load-carrying cords are concentrated in twin grommets. These grommets are cord loops made like giant twisted cables except that they're endless. Since there are no center cords, the Grommet belt is more flexible, and so can "give" temporarily and absorb shock loads. As a result, Grommet belts last 20 to 50% longer, depending on the service.

This company, like many others, is making a 3-way saving with Grommet V belts. First, they save on replacement costs because Grommet belts last longer. They save on production costs with no shutdowns caused by belt failures. And they save on maintenance costs because these belts need less attention. Yet the savings they make are clear profit because Grommet belts cost not one cent more than ordinary V belts. Next time you need V belts, order Grommet V belts from your BFG distributor. Or write *The B. F. Goodrich Company, Dept. M-201, Akron 18, Ohio.*

Grommet—T.M. The B.F Goodrich Co.

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

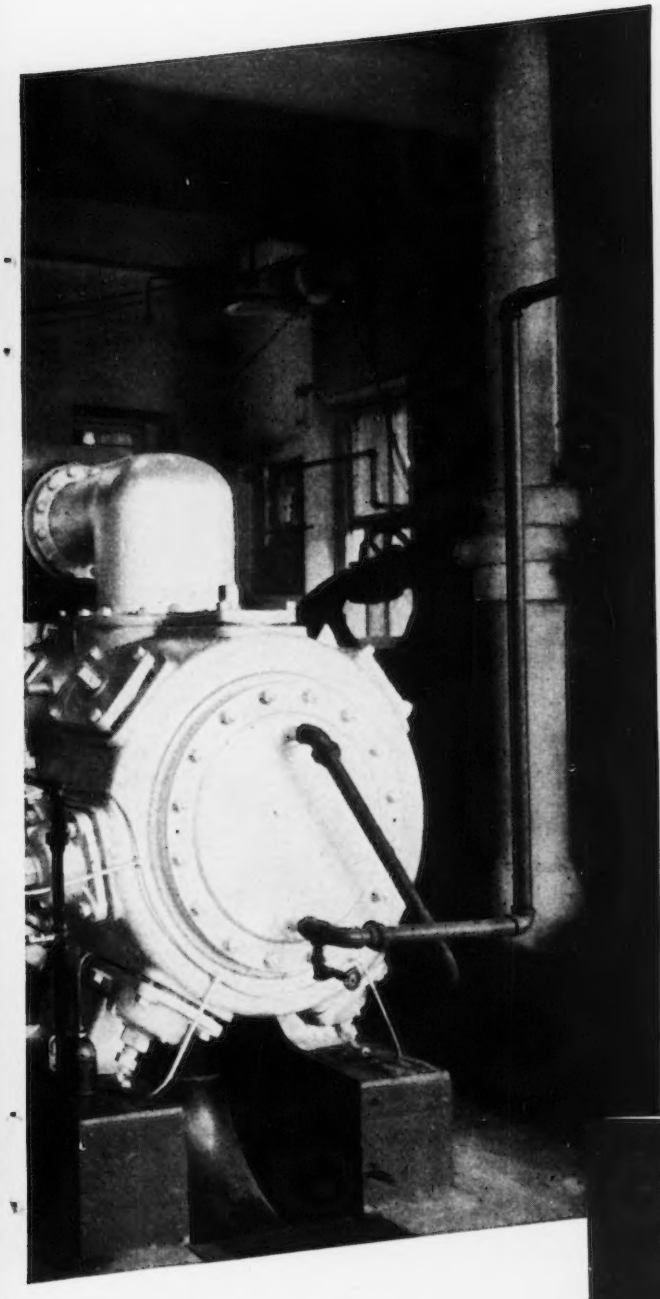
SURE WAY TO LOWER COSTS



TUNE IN:
METROPOLITAN OPERA
radio broadcasts
every Saturday afternoon.
See newspaper for
time and station.

TEXACO

TEXACO
REG. T.M.



AIR COMPRESSORS run efficiently and economically only when they are lubricated to meet the specific operating conditions. No *one* oil can do a satisfactory job under *all* conditions. The sure way to increase compressor efficiency and lower costs is to buy from a source that has the lubricants and the know-how to meet your exact requirements. Call on Texaco.

There is a complete line of Texaco air compressor oils to assure clean, efficient low cost performance from every type and size of compressor, under every operating condition. A Texaco Lubrication Engineer will gladly recommend the one exactly right to give *you* best results.

For your rock drills—to extend their life and reduce maintenance costs—use *Texaco Rock Drill Lubricant EP*. Its extreme pressure properties protect against wear, and it prevents rust whether drills are running or idle.

Call a Texaco Lubrication Engineer today—at the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

FOR OVER 20 YEARS, MORE COPPER ORE HAS BEEN MINED IN THE U.S. WITH TEXACO-LUBRICATED EQUIPMENT THAN WITH ANY OTHER

Lubricants and Fuels

FOR THE MINING INDUSTRY

Here's the COST-CUTTING DRILL

TUNGSTEN—*This driller bottoms holes quickly and easily with the Joy combination in a tungsten mine.*

COPPER—*This driller, in a square set stoping operation can stand safely back from the face while he drills a round with the Joy Air Leg and LM-47.*

COPPER—*This Joy Air Leg and LM-47 Drill make it easy to drill off a drift round in this Arizona copper mine.*

IRON ORE—An adaptation of the Joy Air Leg for drilling soft ores in the Iron Country is this model equipped with the Joy H-37 auger drill. Versatility of the Joy combination is shown here in its use as a stoper, an arrangement made possible by mounting in such a way that the drill and leg may be placed in almost parallel positions.

with "ONE-HAND CONTROL"!

JOY Air Leg and LM-47 Drill

Ever think you'd find an air leg and drill combination that would meet as many cost-cutting and ease-of-handling requirements as this?

1. **One-hand feed control built into the backhead—easy to handle.**
2. **Outdrills any other drill and leg in competitive tests.**
3. **Has lower maintenance cost than any other drill and leg used in the same mine.**
4. **Well-balanced for ease of handling and for minimum misalignment of drill and steel.**
5. **Lightweight and easily assembled, dismantled and moved around the mine.**

That's the story of the Joy Air Leg and LM-47 Drill. They're a perfectly matched pair. Write today for complete information. ● *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

NICKEL—*This driller shows "one-hand" operation of the Joy Air Leg and LM-47 as he drills face holes in a nickel mine.*

IRON ORE—*Face drilling in hard ores is not a tough job at all with these Joy legs and LM-47 drills.*

Consult a Joy Engineer

W&D M3072

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

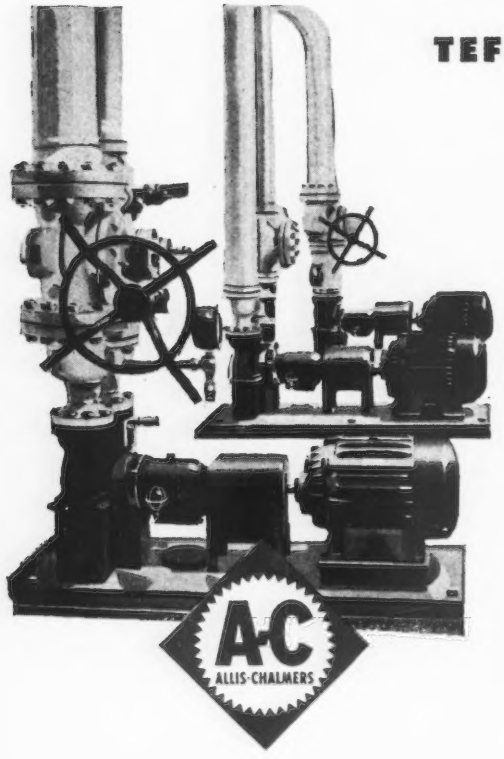
GREATER PROTECTION AGAINST FOREIGN MATTER—LONG

new motors - new

OPEN—DRIP-PROOF

Here are a few of the reasons why the new Allis-Chalmers open—drip-proof motor in NEMA rerate sizes will give you better performance and lower maintenance costs in general-purpose applications.

- Better protection against falling water and debris because cooling air inlets are on bottom.
- Long bearing life because large grease chambers provide plenty of reserve lubricant and are thoroughly sealed against foreign matter.
- Quieter operation, smoother performance.



TEFC and EXPLOSION-PROOF

For especially dirty, corrosive or hazardous applications, you will get top performance with low maintenance costs from the new Allis-Chalmers totally-enclosed, fan-cooled and explosion-proof motors in NEMA rerate sizes. Here are a few of the reasons:

- Foreign matter kept out of bearings and motor interior by double labyrinth seals inside and outside of bearings, and long running fits between shaft and seals.
- Bearing maintenance reduced because large grease chambers provide space for reserve lubricant; also, if required, grease may be renewed without dismantling.
- Easy to clean — no inaccessible air passages. Dirt wipes or blows off easily.

ALLIS-

LIFE BEARINGS—MANY TRIED AND PROVEN FEATURES

GET COMPLETE INFORMATION NOW

Allis-Chalmers, Milwaukee 1, Wis.

Send for these bulletins:

- ☐ Open — Drip-Proof, Type G, 51B6210
- ☐ TEFC, Type GZ, 51B7225
- ☐ Explosion-Proof, Type GZZ, 51B7286

Name.....

Company.....

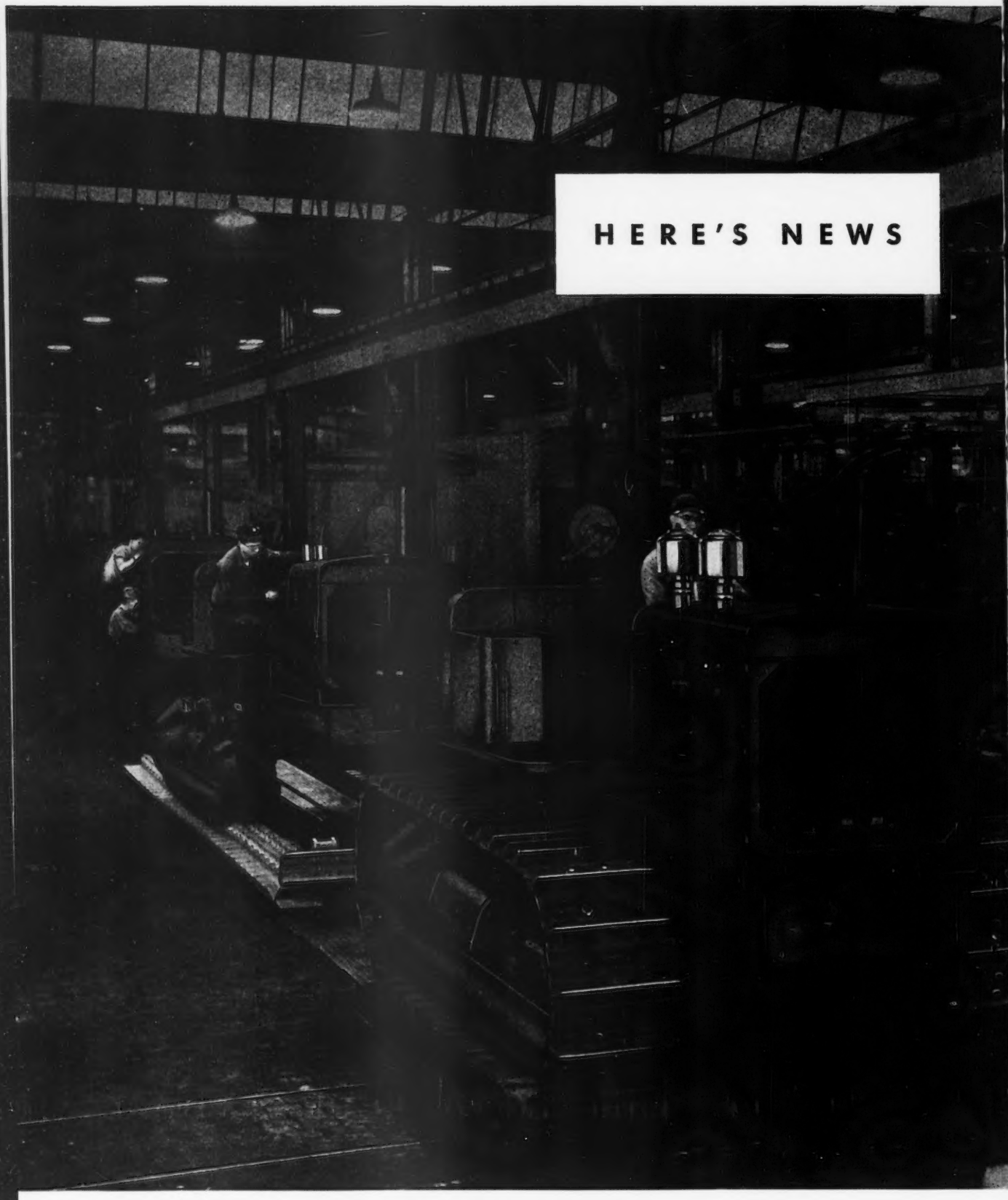
Position.....

Address.....

City and State.....

A-4280

CHALMERS



They're here now! **28,000-lb. HD-15's with torque converter drive are already rolling off the assembly line.**

Allis-Chalmers Powerful HD-15 adds to its big work advantages

. . . now offers choice of two outstanding drives—

standard transmission with time-saving shift pattern,

or widely accepted hydraulic torque converter drive

From its introduction, the Allis-Chalmers HD-15 has set new standards in performance and long-life service . . . in a new size class. It combines outstanding strength and balance with plenty of power, plus a simplified, time-saving transmission that gives big work output. In addition, the HD-15 offers remarkable service simplicity, with features like unit assembly and 1,000-hour lubrication intervals for truck wheels, idlers, and support rollers. It has proved itself the kind of tractor required on today's jobs.

Now, hydraulic torque converter drive is added as optional equipment — an additional working advantage for the powerful HD-15. This advanced design drive was introduced by Allis-Chalmers in the world's *first* torque converter tractor nine years ago. This modern drive gets more done because it automatically provides the right combination of speed and pull every working minute . . . and hydraulic cushioning assures longer life for both tractor and auxiliary equipment.

Now you can choose the HD-15 with standard transmission *or* hydraulic torque converter drive. Either way you'll be getting the most advanced tractor in the business. Let your Allis-Chalmers dealer give you *all* the reasons why.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

TORQUE CONVERTER

Symbol of greater output, longer life.

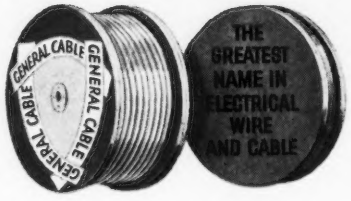
GENERAL CABLE

THE GREATEST NAME IN ELECTRICAL WIRE AND CABLE

To wire a plant or wind a coil

IT PAYS TO BUY IN ONE PLACE!

Actually there is only one source for all of the types of wire and cable you may need...that's General Cable. To meet your every requirement, General Cable manufactures bare, weatherproof and insulated conductors of every variety ...maintains vast stocks...the broadest distribution facilities in the industry...ultra-modern plants coast to coast. Specify "General Cable." Don't settle for less.



GENERAL CABLE CORPORATION 420 Lexington Avenue, New York 17, New York

Sales Offices: Atlanta • Buffalo • Cambridge (Mass.) • Chicago • Cincinnati • Cleveland • Dallas • Detroit Houston • Indianapolis • Kansas City • Los Angeles • Milwaukee • Minneapolis • Newark (N. J.) • New York • Philadelphia Pittsburgh • Portland (Ore.) • St. Louis • San Francisco • Seattle • Syracuse • Tulsa • Washington, D. C.

YOU THINK YOUR DIGGING PROBLEMS ARE TOUGH

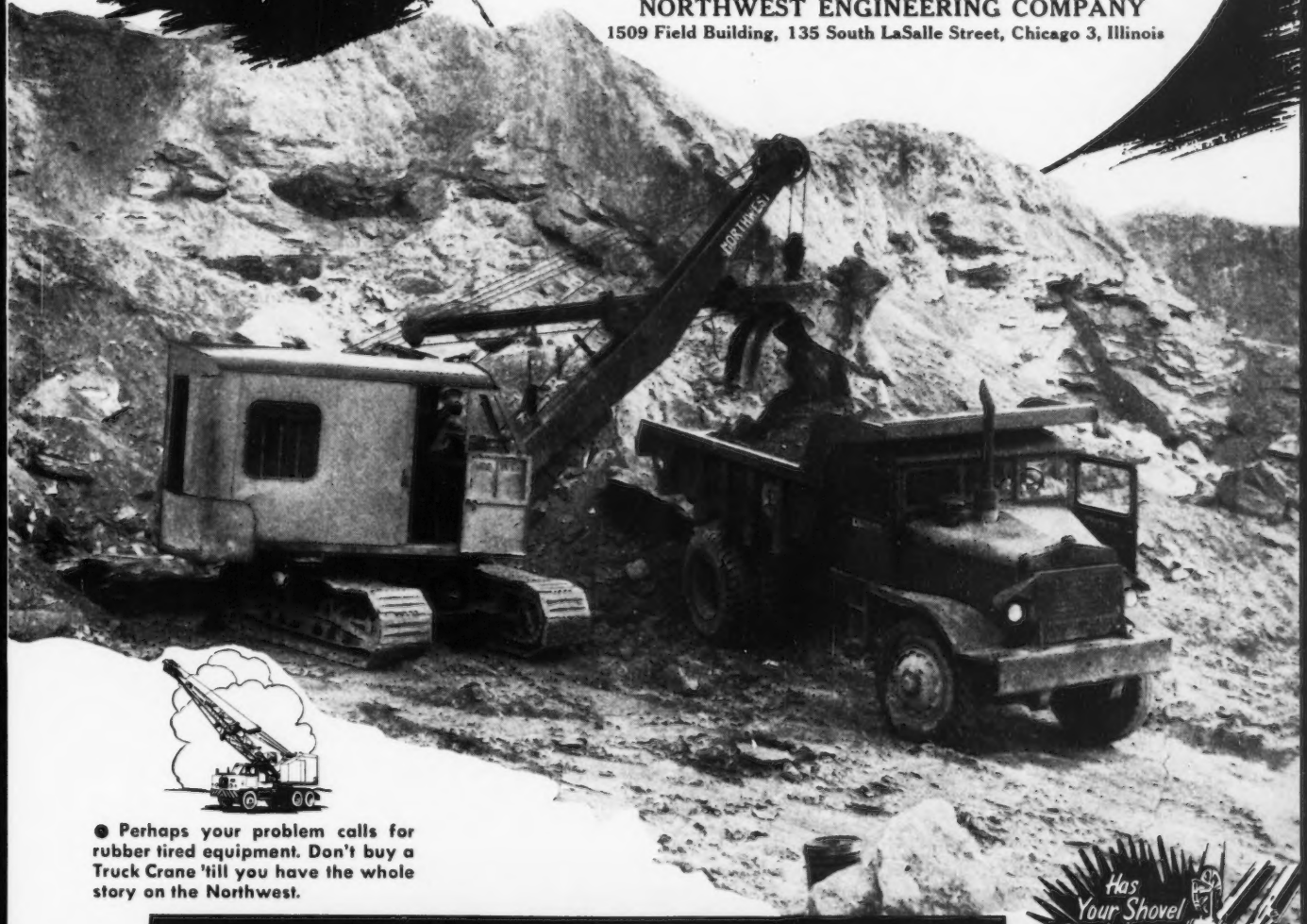
HERE'S as tough a bit of mining as ever tested out a shovel. This is Kyanite, an aluminum silicate used in ceramics to offset the shrinking of clays.

Kyanite is hard — often reaching a hardness of 7.

Northwests have the stamina for mining operations like this. The Northwest Dual Independent Crowd utilizes force most other independent crowds waste, giving that extra push for hard rock work. The "Feather-Touch" Clutch Control makes operation easy without pumps, compressors, valves, or tubing. The Cushion Clutch eliminates overloads before they can damage operating machinery. Cast steel bases and machinery side frames take the shocks of rock digging. Uniform Pressure Swing Clutches eliminate the jerks and grabs that make spotting heavy loads difficult. These and many other Northwest advantages combine to make the Northwest a *real* Rock Shovel.

If you have a pit problem or are modernizing get complete details on Northwest equipment. Ask to see a Northwest Man.

NORTHWEST ENGINEERING COMPANY
1509 Field Building, 135 South LaSalle Street, Chicago 3, Illinois



● Perhaps your problem calls for rubber tired equipment. Don't buy a Truck Crane 'till you have the whole story on the Northwest.

NORTHWEST

Convertible for any Mining Material Handling or Excavation Problem

7 important Dumptor advantages

Take another look at the latest model Koehring 6-yard Dumptor shown here. It has some important features worth checking. Notice how heavy snubber-spring on steering axle cushions road shocks — yet retains Dumptor's unique advantage of no spring maintenance. There are no leaf springs. Big shock-absorbing drive tires eliminate need for springs on the drive axle.

Alignment of drive wheels with steering wheels adds to efficiency of Dumptor no-turn shuttle hauling — makes a big difference in traction and flotation when Dumptor is shuttling back and forth across loose stockpiles, soft ground.

Another basic Dumptor advantage is instant gravity dump. It's controlled by a simple body latch and new dump lever arrangement. Gravity dumping eliminates slow-acting, troublesome body hoists — never balks, never wears out. Notice, too, the new streamlined, all-steel body. Even with all this heavy-duty strength, Dumptor still has more than 6 h.p. for every ton of loaded weight. It accelerates fast, pulls through soft ground and up grades with less shifting — climbs 24% grades fully loaded.

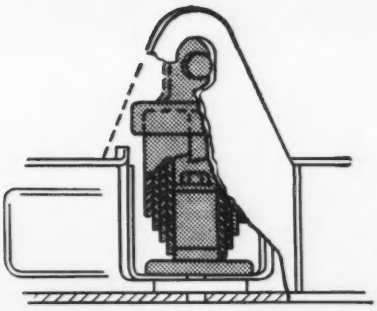
Let your Koehring Distributor give you all the latest Dumptor® facts. See him soon, or write.

KOEHRING COMPANY

MILWAUKEE 16, WISCONSIN

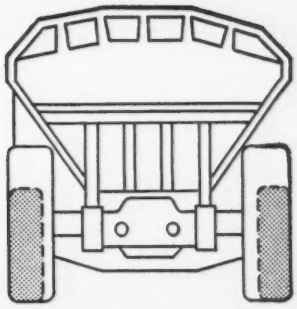
Subsidiaries: PARSONS KWIK-MIX • JOHNSON

K437



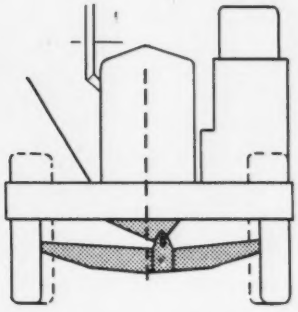
Smooth ride

Heavy, snubber-type spring is mounted between Dumptor main frame and the steering axle. Shock-absorbing action provides plenty of "cushion" — takes all the jolts out of rough, off-road travel. Easy on operator and machine.



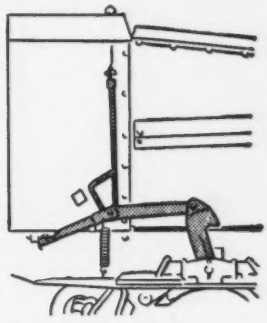
Tires track in direct line

Wider, heavier steering axle puts Dumptor steering wheels in direct line with big drive wheels. Tires track in the same path. There's less rolling resistance, better traction in soft ground, and on rough haul roads.



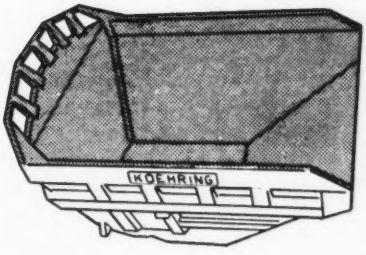
Off-set pivot on axle

Pivot point on steering axle is off-set from center line 3¼" toward operator side of machine. There's no sag, even with unbalanced load. Steering axle oscillates up to 21" — keeps twisting strains out of Dumptor main frame.



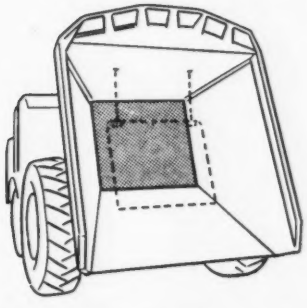
New body-latch, dump lever

Body latch for 1-second gravity dumping is simple, trouble-free. Latch is engaged by a single hook, mounted on the chassis frame. Dump lever is located inside the cab, in an easy-reach position to left of operator.



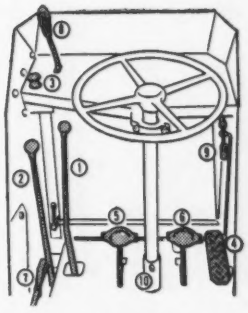
Streamlined, all-steel body

Inside is free of bulges or ledges. Top edge is box-beam constructed. Sides, ends are ribbed with 5 and 8" channels. Double-plate bottom is lined with multiple steel beams. Note ridge bar added to sturdy rock-guard teeth.



Bolted or free-swinging pan

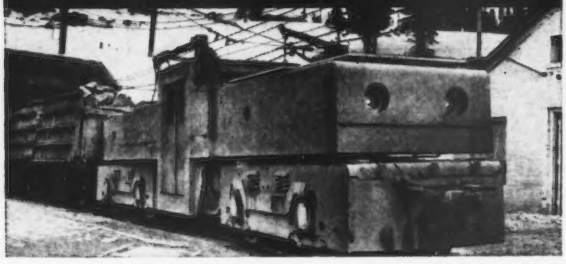
Heavy steel kick-out pan is ½" thick. Pan can be bolted to body floor for extra protection when loading rock. Remove bolts, and pan has free swinging kick-out action — breaks suction when dumping wet or sticky materials.



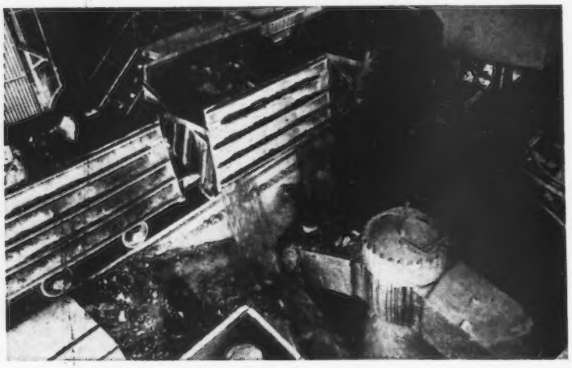
Easy-reach controls:

(1) Speed gear shift lever, (2) directional gear shift lever, (3) starting aid, (4) foot throttle, (5) clutch pedal, (6) brake pedal, (7) parking brake, (8) body-release lever, (9) hand throttle, (10) running lights control switch.

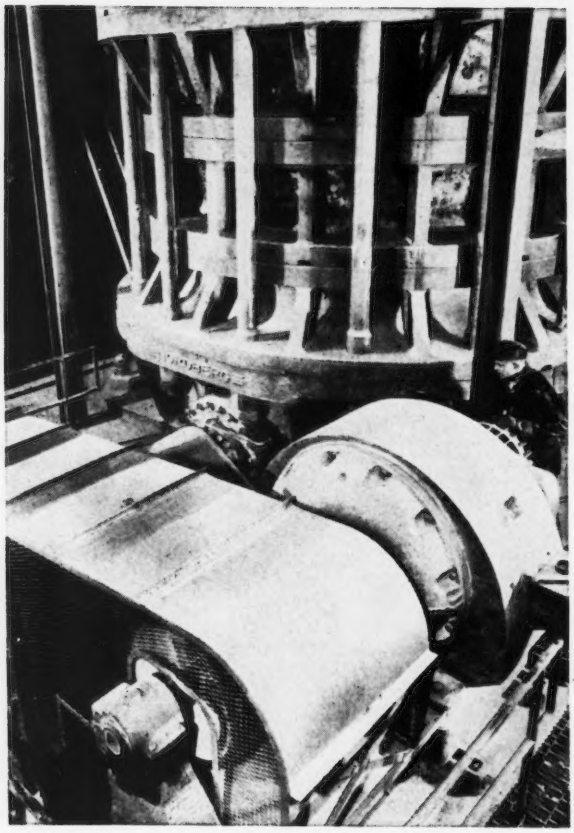
ENGINEERING REPORTS:



1 SEVEN SPECIALLY-DESIGNED 20-ton G-E mine locomotives provide maximum efficiency and safety. Center cab assures maximum visibility, is weather-proofed and heated.



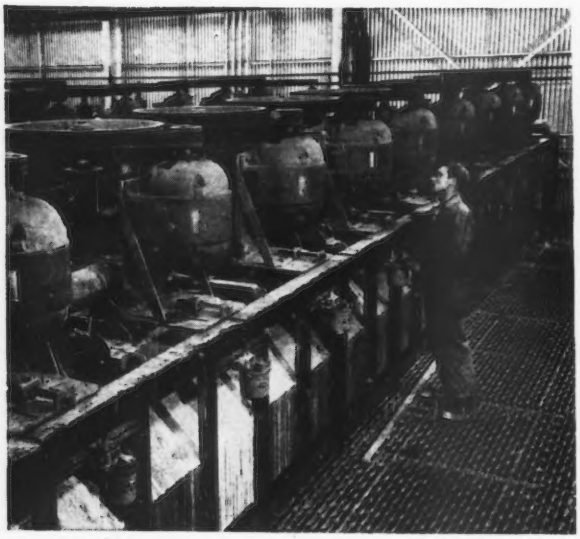
2 GREATER ORE HAULAGE is provided by fast, new G-E locomotives. Each pulls 20, 10-ton cars per trip—and increases the trips per day.



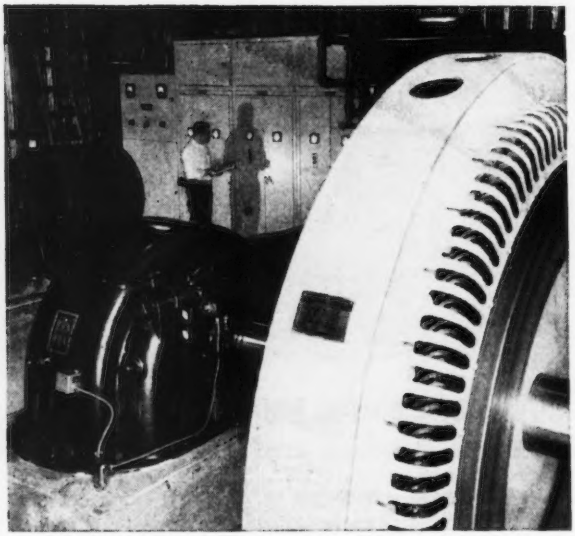
3 WORLD'S LARGEST GYRATORY CRUSHER, driven by dependable G-E 500-hp Tri-Clad* wound rotor motor, is a key feature of the Climax expansion program.

*Reg. trade-mark of the General Electric Company

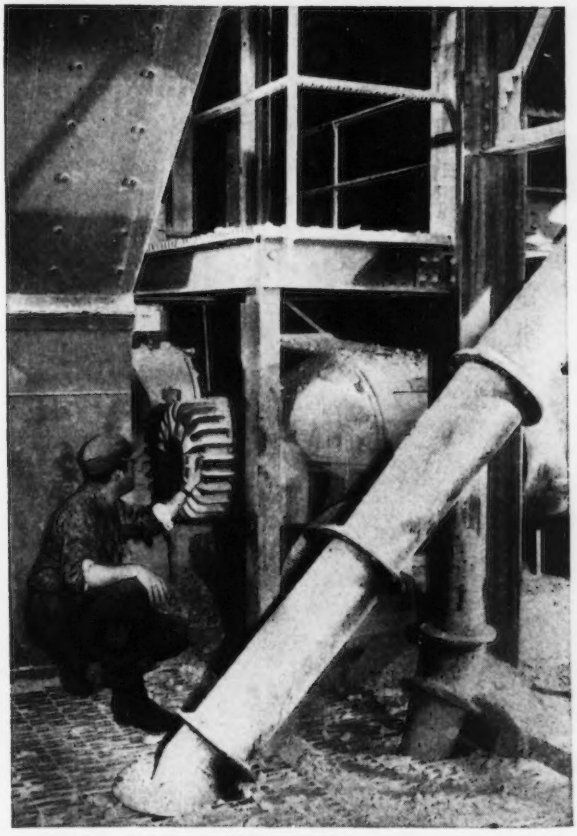
Climax Molybdenum expands,



7 HIGH EFFICIENCY is provided in flotation cells by G-E 7½-hp squirrel-cage motors—an important factor in round-the-clock operation. Convenient, individual oil-tight controls enable motors to be reversed when necessary.

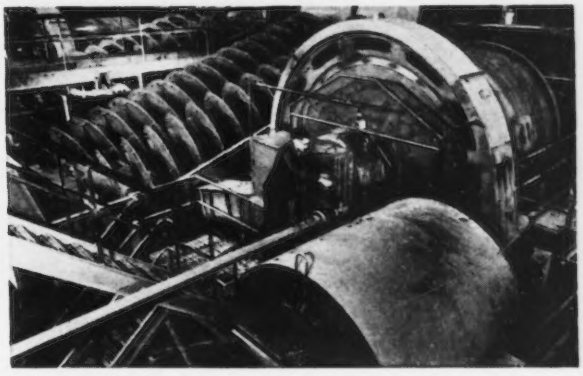


8 AIR COMPRESSORS at Storke Level are driven by G-E synchronous motors, one 500-hp and one 600-hp in foreground. D-c power for Storke Level locomotives is provided by 300-kilowatt G-E mg set through G-E control (background).



4 **SPECIAL CONE-CRUSHER DRIVE** assures a minimum of interruptions and less maintenance. Enclosed collectors on G-E Tri-Clad wound rotor motor helps protect against dust.

5 **PRODUCTION CONTINUITY** is provided by enclosed, heated conveyors driven by 350-hp and 250-hp motors. These carry ore from Storke Level crusher to final-stage crushing.



6 **HEAVY-DUTY G-E MOTOR**—500-hp, 300-rpm—under enclosure (foreground) drives this large ball mill which is in closed circuit with classifier.

hits record 23,000 tons a day

Co-ordinated G-E electrical system plays key part in setting record output of mine and mill

A multimillion-dollar expansion program now in process has enabled the Climax Molybdenum Company, Climax, Colo., to reach a record output of 23,000 tons of raw molybdenum ore per day. It will become one of the world's largest underground mines with a daily output of 28,000 tons when the program is completed. Instrumental in making this output record possible were General Electric application engineers who worked closely with Climax engineers to co-ordinate the project's electrical system.

In this remote mountain location, with operating points great distances apart, the G-E electrical system has helped integrate the mining and milling processes into a smooth-flowing production line. By providing reliable, 24-hour-a-day operation, co-ordinated G-E electrical systems helped to step up daily production as much as 5000 tons within the last two years—another example of the value of system planning.

The same G-E engineering leadership which helped Climax reach its record output is available to you for your expansion or modernization planning. Contact your Apparatus Sales Representative at your nearest G-E Apparatus Sales Office—early in the planning stage. General Electric Co., Schenectady 5, N. Y.

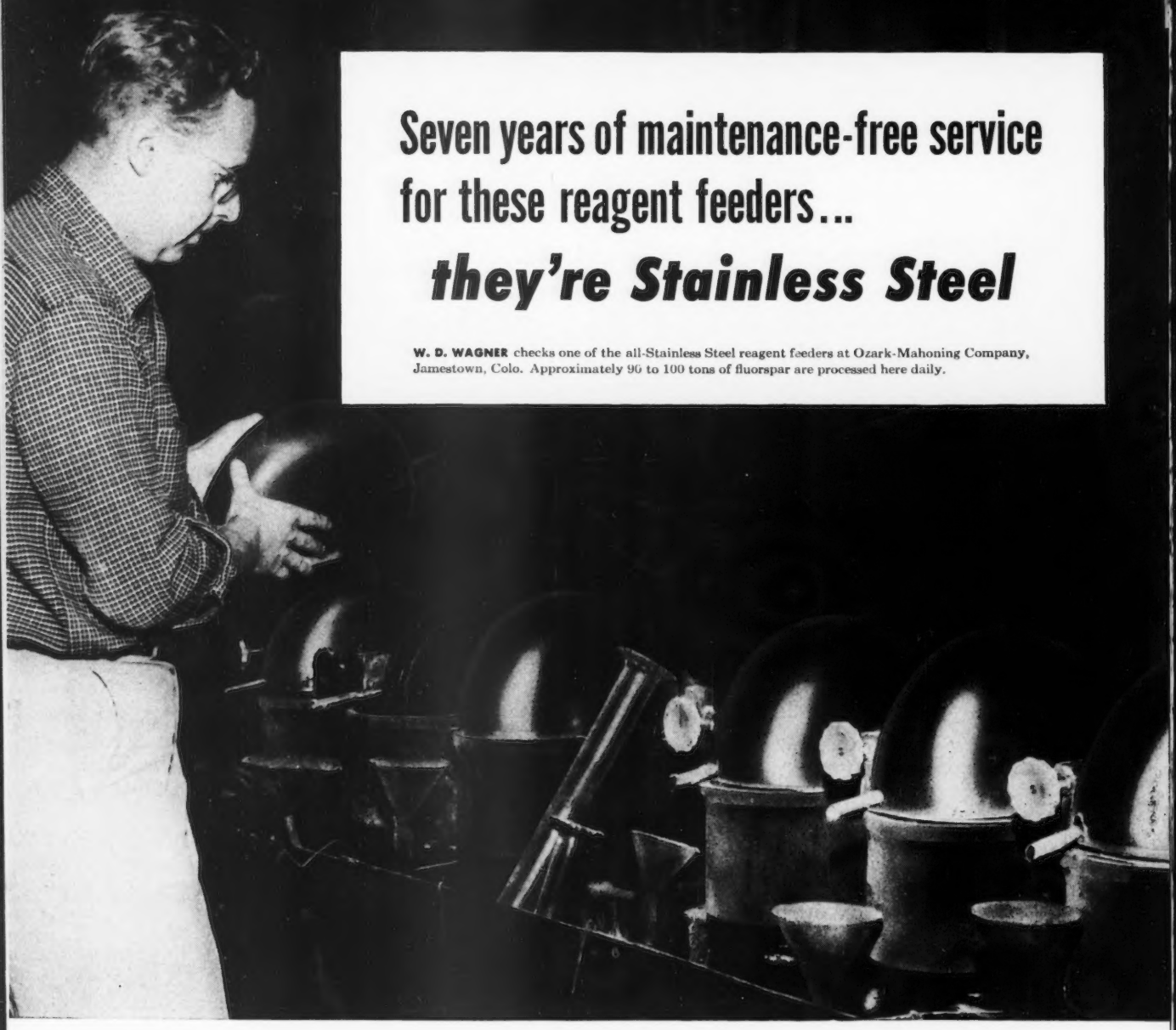
660-30

Engineered Electrical Systems for the Mining Industry

GENERAL ELECTRIC

Seven years of maintenance-free service for these reagent feeders...

they're Stainless Steel



W. D. WAGNER checks one of the all-Stainless Steel reagent feeders at Ozark-Mahoning Company, Jamestown, Colo. Approximately 90 to 100 tons of fluorspar are processed here daily.

FEEDING a stream of sodium xanthate into flotation separation tanks, these reagent feeders at the Jamestown, Colo., fluorspar operations of Ozark-Mahoning Company are made of corrosion-resisting Stainless Steel.

It's an application of Stainless that has paid off handsomely, too, for these feeders have been in operation 24 hours a day, six days a week for seven years without replacement or even maintenance. And they are in good condition today with no sign of failure.

Reagent feeders are used at nine points along the processing line at this Ozark-Mahoning operation. The reagent promotes flotation of the fluorspar and helps in separating it from ore tailings.

Reagent feeders like this, with their highly-corrosive contents, give you longer, lower-cost service when they are made entirely of Stainless Steel. But they are only one of hundreds of places in the non-metallic and metallic mining industries where Stainless Steel's resistance to corrosion and abrasion make it a paying investment.

Take full advantage of this metal, and when you do, be sure perfected, service-tested USS Stainless Steel is used. It is made to give you the finest performance.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS STAINLESS STEEL

SHEETS • STRIP • PLATES • BARS • BILLETS USS PIPE • TUBES • WIRE • SPECIAL SECTIONS

4-562

UNITED STATES STEEL

PERFORMANCE PAYS OFF!

THE tires you buy or specify can help keep you ahead of schedule—or drop you into a mess of dead equipment, idle men and busy red ink.

Goodyears are the best workers—the longest wearers—the tires *specifically designed* to thrive on your kind of jobs—to give you lower costs per hour.

It takes worlds of experience to build such tires—and Goodyear has it. Goodyear has built more tires for more specific purposes than anyone else on earth. So when you buy or specify Goodyears, you're buying the tires that can put more money in your pockets. Goodyear, Truck Tire Department, Akron 16, Ohio.

HARD ROCK LUG
for stamina and full pull, forward or reverse, on all kinds of tire-killing work.

HARD ROCK RIB
for front wheels on all tire-killing service. Rugged—smooth rolling—easy steering.

ROAD LUG
for toughness and super-traction OFF the road and long, smooth mileage ON the road.

FOR EACH JOB, THERE'S A COST-CUTTING GOODYEAR TIRE!

America Needs Better, Safer Roads — Let's Bring them Up to PAR

Road Lug—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

We think you'll like "THE GREATEST STORY EVER TOLD"—every Sunday—ABC Radio Network—THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network

To whip tight quarters lead mine teams Tournarocker with

To reach a new supply of ore, one of the Midwest's largest lead mining companies has just opened a new mine, driving an 825′ tunnel through dolomitic limestone. Running on a 10% grade, the new tunnel is 10′ high, 12′ wide . . . floor is wet, soupy in spots. A 9-ton rear-dump D Tournarocker hauled away all the waste rock. This 28 mph rubber-tired unit was driven in via highway from underground ore-hauling at another of the company's mines.

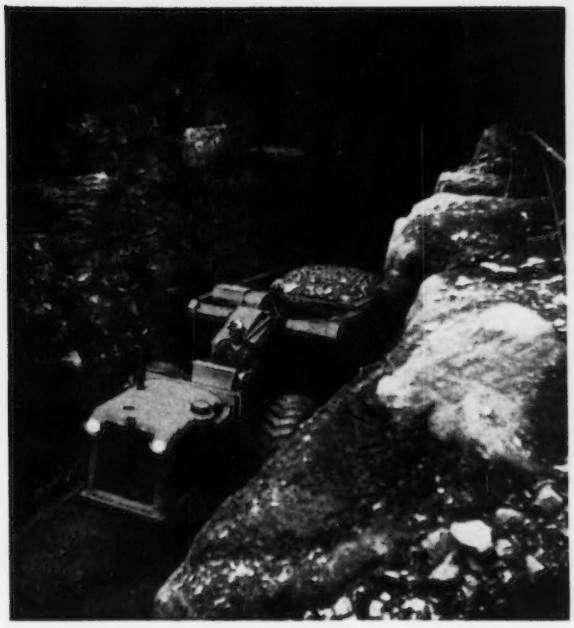
Work at the tunnel was on a two-shift basis, with one shift drilling and blasting, second shift cleaning up. *In just 5 hours,* Tournarocker, loaded by a Rogers Ramp, consistently removed all material loosened in the previous shift. Job required only two men, one working the loader, the other operating Tournarocker.

According to the Mine Captain, at time pictures were taken, the electric-control Tournarocker was completing 1-mile round-trip cycles every 14 minutes. In addition to load time, this included backing 750 ft. down the tunnel, with half of haul up 10% adverse grades.

Permanent underground duty

This Company has 2 other D Tournarockers assigned to permanent underground duty, hauling ore and waste rock. With power-steer and short 12′4″ turning radius,

HIGH-SPEED, RUBBER-TIRED EXCAVATING • HAULING • LIFTING EQUIPMENT



At waste dump, load slides clean. Streamlined body clears load quickly, positively. In freezing weather, body can be electrically heated to prevent load from sticking. With fingertip electric controls and power-steer, operator has instant positive control of unit at all times . . . works easily . . . is less tired at the end of the day.

Hauling to dump, Tournarocker's Tournamatic differential automatically proportions drive-wheel torque . . . gives the wheel on firmest footing up to four times more power than the slipping wheel. The "D" will "walk" right up grades that stall other haulers.

Tournarocker is loaded by a Rogers Ramp. Big, low-entry target makes the "D" ideal for shovel or rear-entry conveyor loading, especially in tunnels with low overhead clearance.

# of 10′x12′ tunnel overhead loader

they are ideally suited to work in these restricted tunnel quarters. Big low-pressure tires give excellent traction, even on "soupy" floor or on wet, slippery haul road. There are no divided faces as on "duals" where rocks can wedge in and tear. Track problems with crawlers are eliminated. Rocky conditions at the mine would cause considerable track, link and pin breakage . . . the abrasive limestone, excessive track wear.

Mine operators are turning more and more to rear-dump Tournarockers for low-cost hauling of rock, gravel, ore, and other materials under tough conditions. Your LeTourneau-Westinghouse Distributor will be glad to show you job-proved facts and production figures on 9, 18, 35, or 50-ton Tournarockers. Better still, let him demonstrate Tournarocker at *your* mine or quarry.

The recent purchase by Westinghouse Air Brake Company of the earthmoving and related business of R. G. LeTourneau, Inc., combines two firms which are world leaders in their respective fields. It brings together the earthmoving know-how of LeTourneau and the precision manufacturing and research experience of Westinghouse Air Brake. You can buy from this strong new company with even greater confidence than before.

Tournarocker, Tournamatic—Trademark Reg. U.S. Pat. Off. DR-412-M

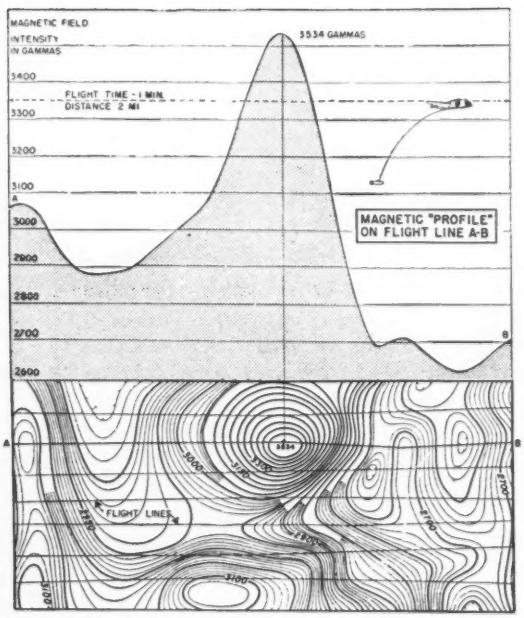
LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Airborne Magnetometer at work near Johannesburg

New Aerial Methods can in Exploration and



Profile of an ore body

The high hopes that mineral exploration would be greatly aided by the airborne magnetometer have been realized. Pay-off finds are being made, often in blind areas. And mining engineers are speeding the planning and development for these and other areas with photo-reconnaissance and aerial topographic maps.

The most important new aid to mining exploration today is the airborne magnetometer. With it AERO is helping to uncover major new mineral finds in the United States, Canada, South America and Africa. A typical recent discovery was a massive magnetite body, at a depth of about 2,000 ft., with no surface expression. It was located through an aeromagnetic survey of 900,000 acres in eastern Pennsylvania, flown in 30 days. In Canada, the airborne magnetometer revealed another large magnetite body near Marmora and deposits in Labrador and other areas.

Magnetic peaks such as this, over an iron ore deposit, are recorded by the airborne magnetometer. Major finds of iron, nickel, titanium, and asbestos have been made with the aid of the flying magnetometer.

Photo-maps for reconnaissance ... topo maps to speed engineering plans

Swift, low-cost reconnaissance is obtained with air photos. They are useful for geologic study—and as photo-maps for plotting property lines and bore holes, locating spoil dumps, and other planning.

Richly detailed, dependable topographic maps are compiled by aerial methods at a fraction of the cost and time for ground surveys. They are used for all types of engineering planning.

save time and money Development programs

AERO'S experienced crews have aided the search for nickel, titanium, asbestos, iron, and other minerals. Exploration costs usually are only a few cents per acre. In a number of cases, the magnetic data was so direct and positive that claims parties were dispatched within 24 hours after the survey flights. In fact, the magnetic data often is so revealing that large mining companies find it to be worthwhile for their chief geologists to go into the field with the air survey group. At the advance base they evaluate and act upon the aeromagnetic data as it is collected day by day.

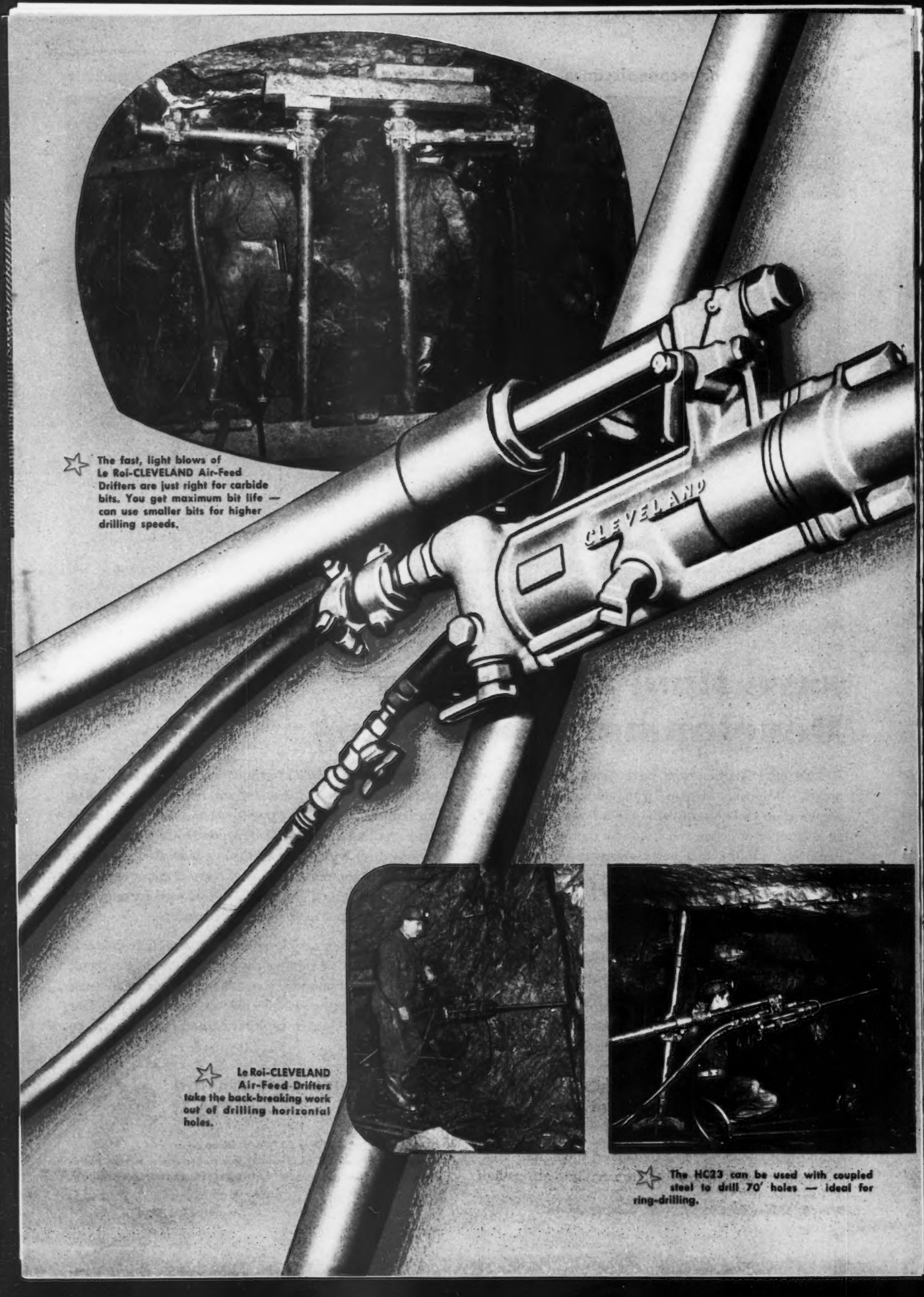
Supplementing the airborne magnetometer is another aerial survey tool—the mapping camera. At low cost it rapidly collects information about surface geology. The air photos are compiled in photomaps, which are used for broad exploration planning, to plot property lines and bore holes, to locate spoil dumps and reclamation areas, and for general planning.

AERO topographic maps further speed the mining engineer's planning. These maps are compiled at one-half of the cost and time of ground surveys (*or less*). They aid in the location of access roads, rail spurs, town sites, harbor facilities, and help with other development planning. AERO'S maps are so dependable they are used to estimate cut and fill for earthwork bids. Recent typical assignment: mapping Cerro Bolivar—2 meter contours, and scale of 1:1000. The maps will be used for engineering planning and management discussions.

These tested new aerial methods are especially valuable in first stages of mining exploration or development, when time and manpower saved can so greatly advance the date when actual mining operations begin. Our 34 years experience in exploration and mapping will be helpful to you.

AERO SERVICE CORPORATION
PHILADELPHIA 20

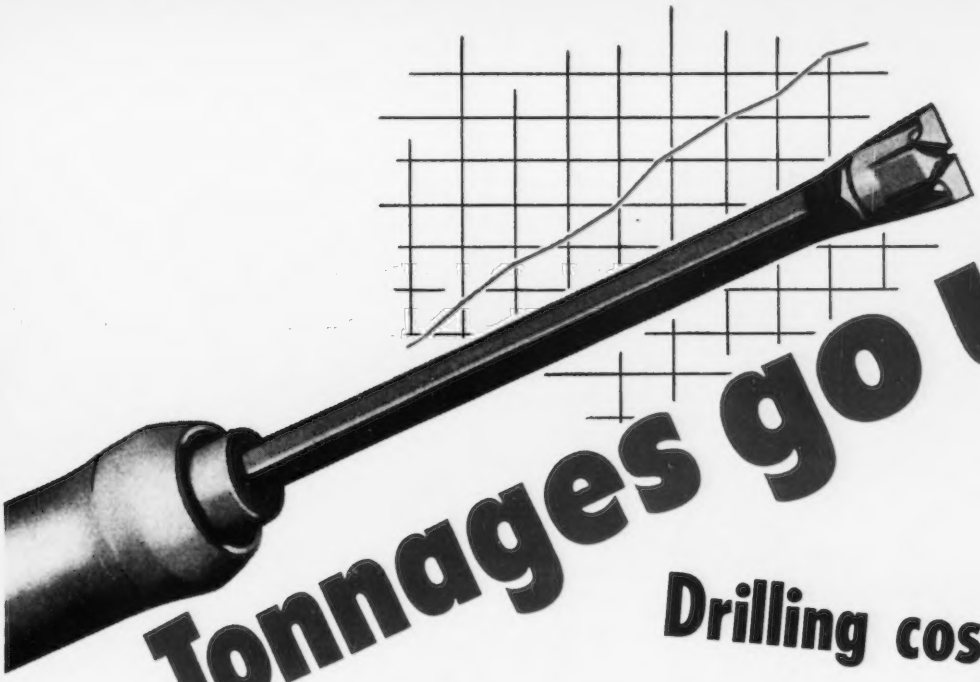
Oldest Flying Corporation in the World, whose crews are at work all over the globe on airborne magnetometer surveys, photo-maps, topographic maps, relief models and Shoran-controlled mapping.



The fast, light blows of Le Roi-CLEVELAND Air-Feed Drifters are just right for carbide bits. You get maximum bit life — can use smaller bits for higher drilling speeds.

Le Roi-CLEVELAND Air-Feed Drifters take the back-breaking work out of drilling horizontal holes.

The HC23 can be used with coupled steel to drill 70' holes — ideal for ring-drilling.



Tonnages go up!

Drilling costs go down!

with Le Roi-CLEVELAND Air-Feed Drifters

YOU lighten the load on miners — take the hardest part of the work out of drilling — when you equip them with Le Roi-CLEVELAND Air-Feed Drifters. Men don't tire so fast — safety records improve — tonnages rise.

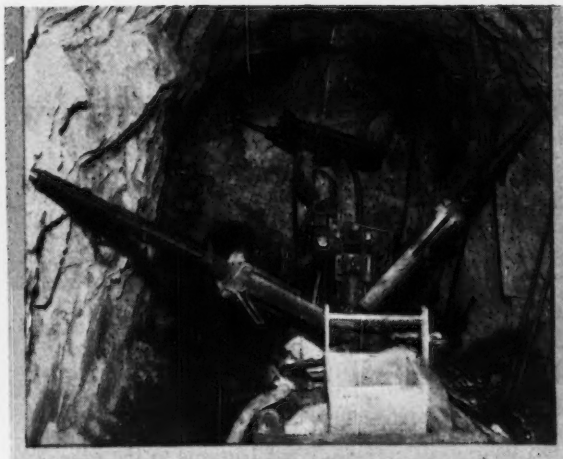
Here are some reasons why: (1) You can use the Model 83 lightweight pneumatic air column to speed set-ups. (2) Fast reverse feed makes changing steels quick and easy. There are no swing or dump nuts to loosen or tighten. (3) Positive air feed gives right pressure for maximum drilling speed. (4) Fast, light blows are just right for carbide bits.

Le Roi-CLEVELAND Air-Feed Drifters are available in two sizes: HC10R with 2⅝"-bore machine and HC23R with 3⅛"-bore machine. See how either model gives you longer bit life, lets you use smaller bits for higher drilling speeds — helps you get higher man-shift production, greater safety, and lower drilling costs. Write for further information.

LE ROI COMPANY CLEVELAND ROCK DRILL DIVISION

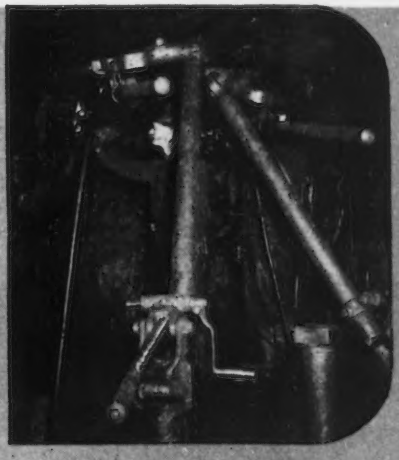
A Subsidiary of Westinghouse Air Brake Co.
Plants: Milwaukee, Cleveland and Greenwich, Ohio

12500 Berea Road, Cleveland 11, Ohio



Le Roi-CLEVELAND Air-Feed Drifter mounted on air-motor-powered boom of Le Roi-CLEVELAND Self-Leveling Mine Jumbo in a Western zinc and copper mine.

Feed controls are conveniently located on Le Roi-CLEVELAND Air-Feed Drifters. Reverse air feed withdraws steel from hole quickly.



The accent's on production in this mine. Le Roi-CLEVELAND Air-Feed Drifters make possible faster set-ups, faster steel changing, faster drilling.

RD-50

We grind truck axles to

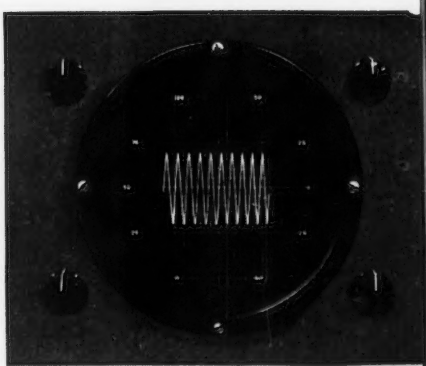
in the new Timken-Detroit indoor proving ground... and only

We jounce, twist and grind them. We abuse, torture and ruin them. We duplicate any on-the-job hauling situation... then add several special brutal tests of our own.

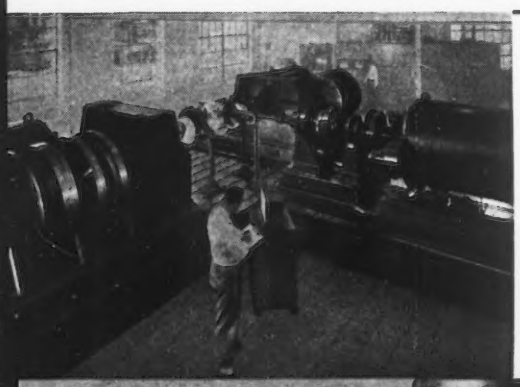
And for good reasons! We can assure you in advance that a Timken-Detroit axle can take a harder beating on the job it was built for than any other axle made!

We capsuled a multi-thousand acre proving ground into one room. Here our engineers put 50 years of experience in building axles for trucks, buses and trailers to work. Here the axles and gearing are subjected—*indoors*—to any *outdoor* hauling condition . . . and scientifically analyzed.

It's research to the "umpteenth" degree. But *you* enjoy: longer truck life; less maintenance, repairs and downtime; lower operating costs. That's why the smart money of truck builders and owners rides on Timken-Detroit axles and gearing.

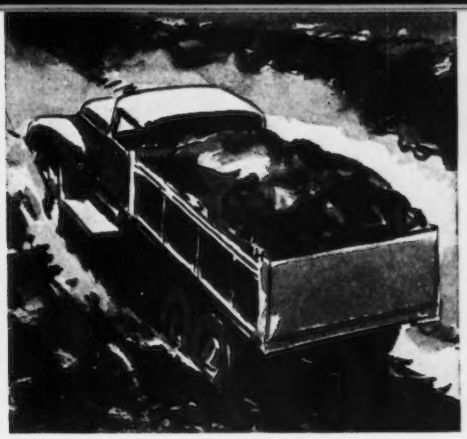


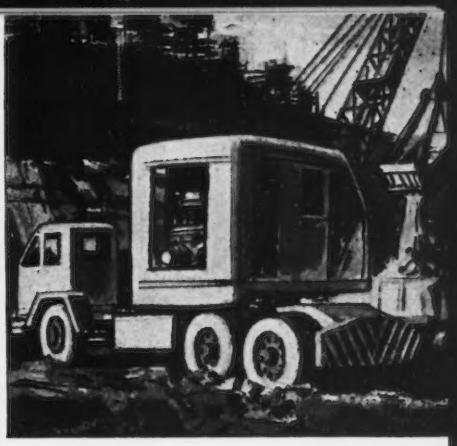
Whatever you haul . . . simulated service conditions show up electronically on a screen like this. For instance—a heavily loaded truck on a bumpy, twisting road—then on a level express highway or long grade. What happens to the axle and gearing is measured, charted with absolute scientific accuracy.



TDA proves axle quality and performance in this "Torture Chamber"

Here we simulate actual highway conditions . . . test quality and performance of axles under any hauling situation, such as duplicating the kinetic energy of 80,000 lbs., G.C.W., at 60 m.p.h. All tests are repeated hour after hour with an automatic cycling control.





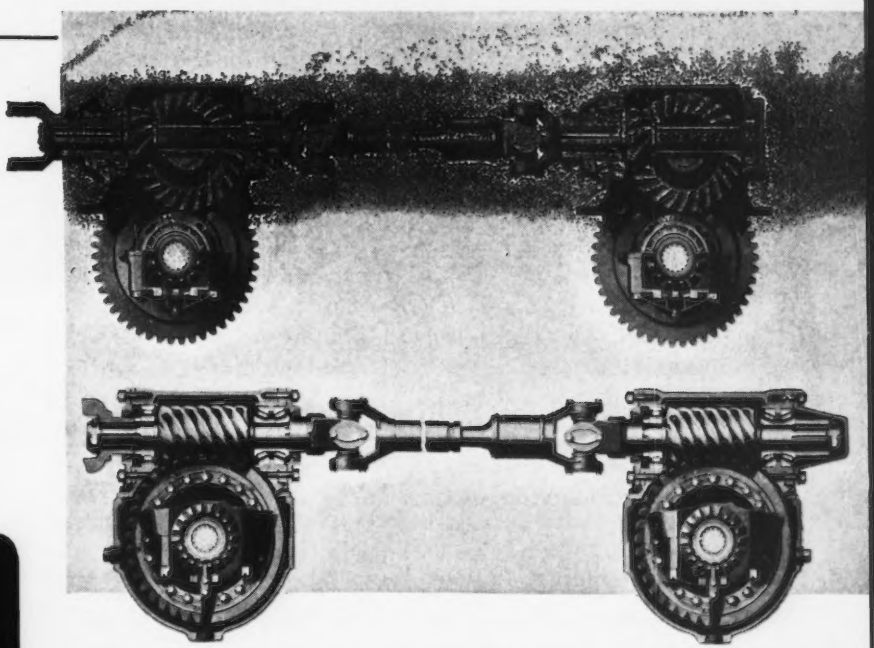
You're hauling overburden . . . you want axles that can get you up, out and on the road—fast . . . with few shifts, low engine r.p.m. and skimpy gas consumption. You want to stay on the job . . . with little expense for maintenance or repairs plus long axle life. You want Timken-Detroit "Torture-Tested" axles with Hypoid gearing!

You're hauling out of the pit...loaded to capacity. It's all uphill . . . on soft, twisting makeshift roadway. It's a job for "man-sized" axles and gearing—units that can take rugged going—and not beat the engine and driver to pieces, nor run up costly repairs and shop time. A job for Timken-Detroit "Torture-Tested" axles with Hypoid gearing.

You're down to coal...working on any ground that'll stand still . . . you need quick mobility, power—and tonnage per day, too! You want a shovel combination that won't call it "quits" when going's rough. You want rugged gearing and axling . . . easy, low-cost maintenance, economical operation. You want Timken-Detroit "Torture-Tested" axles.

pieces

Timken has it!



TIMKEN *Detroit* **AXLES**

TIMKEN DETROIT AXLE DIVISION
ROCKWELL SPRING AND AXLE COMPANY
DETROIT 32, MICHIGAN

The Accepted TDA *Standard*
TRADE MARK REGISTERED

"TORTURE-TESTED"
to Save Money on the Job

WORLD'S LARGEST MANUFACTURERS OF AXLES FOR TRUCKS, BUSES AND TRAILERS

For "Million Mile" performance . . . your choice of two types of Timken-Detroit Tandem Drive Rear Axle Units

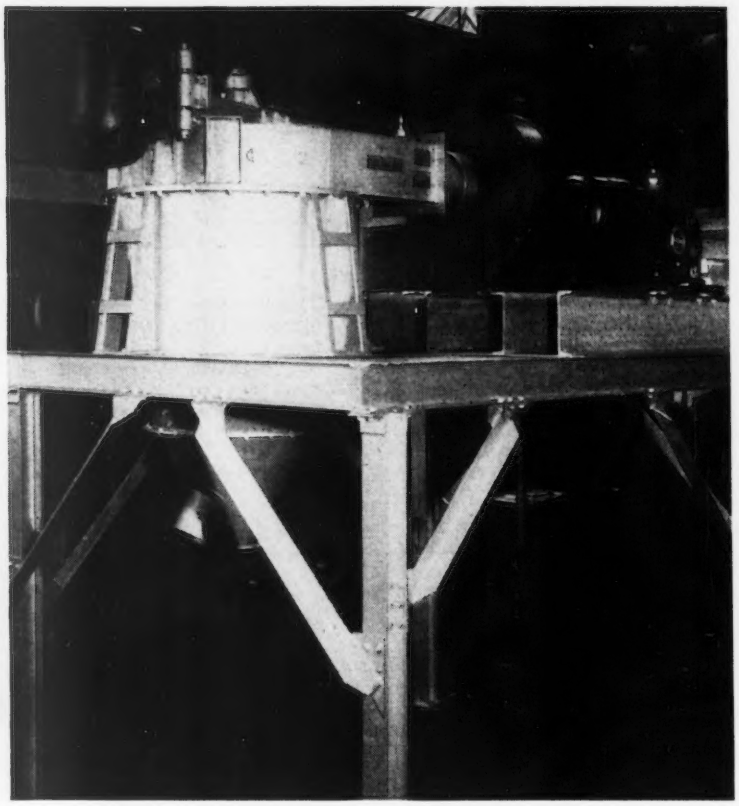
Top-mounted hypoid-helical double-reduction final drive. First reduction is hypoid gear and pinion—second is helical spur-gearing. Hypoid gearing, developed for heavy-duty trucks by Timken-Detroit, assures outstanding performance and low maintenance costs for operators everywhere. Large pinions, greater tooth contact give TDA hypoid-helical gearing the ability to stand the "gaff" of extreme shock loads and hard, gruelling hauling service.

2 Famous *patented* FJ worm gearing, pioneered by Timken-Detroit. "Through Drive" type . . . direct transmittal of engine torque through forward driving axle to rear driving axle. Permanently silent . . . simple, sturdy . . . stands extreme shock-loads without damage. Large diameter worm and worm wheel . . . increased capacity roller bearings . . . easy lubrication . . . light weight make FJ highly desirable for high speed service on any kind of grades.

Plants at: Detroit, Michigan
Oshkosh, Wisconsin • Utica, New York • Ashtabula, Kenton and Newark, Ohio • New Castle, Pennsylvania

NEW TYPE STURTEVANT AIR SEPARATOR

Recovers Fines in Micron Ranges



Now the famous Sturtevant Whirlwind Air Separator, so widely used throughout industry for fast recovery of fines, has been specially designed to "pick-off" classified materials such as pigments, limestone fillers, plastics, oyster shells, etc., in micron sizes.

These highly efficient air separators select a continuously uniform product of desired fineness. Used in a closed circuit with grinding mills, they increase production, cut power costs.

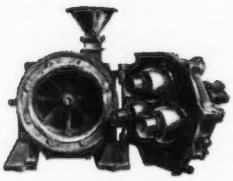
Large feed opening, rugged construction, ease of adjustment, low power consumption assure economy of operation and minimum upkeep. Write for further information.

STURTEVANT
MILL COMPANY
101 CLAYTON STREET
BOSTON 22, MASS.

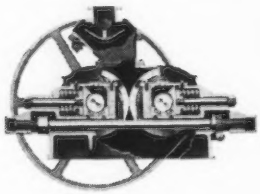
Designers and Manufacturers of:
CRUSHERS • GRINDERS • SEPARATORS
CONVEYORS • MECHANICAL DENS and
EXCAVATORS • ELEVATORS • MIXERS

OTHER STURTEVANT EQUIPMENT

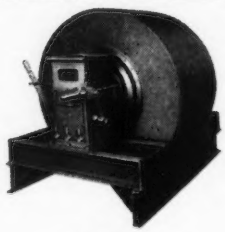
MICRONIZER® GRINDING MACHINE
A fluid jet grinding machine, the Sturtevant Micronizer speeds reduction of materials to low micron sizes. These jet mills are especially applicable in fields where a particle size in microns is desired.
Sturtevant Micronizer grinding machines are available in many sizes and capacities.



RING-ROLL MILLS
For medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operate in closed circuit with Screen or Air Separator. Open door accessibility. Many sizes. No scrapers, plows, pushers, or shields.



CRUSHING ROLLS
For granulation, coarse or fine, hard or soft materials. Automatic adjustments. Crushing shocks balanced. For dry or wet reduction. Sizes 8 x 5 to 38 x 20. The standard for abrasives.



BLENDER
Four-way mixing action assures a thoroughly blended product. Open-door accessibility permits easy cleaning. Available in many mixing capacities for ¼-ton per hour and up.

Keep your buckets moving with TIREX

Notice the line between the bucket and boom base? That's electric trailing cable furnishing power to the shovel. Whatever happens to it to stop current flow stops the shovel, idles workmen, costs money.

Spilling ore beats on the cable. The truck behind the upper end of the dipper sticks runs over it sometimes. High temperature of the sun-heated pit and current load fry it. It gets abraded, strained, soaked in water, and covered with oil. That's why it should be the best cable that money can buy.

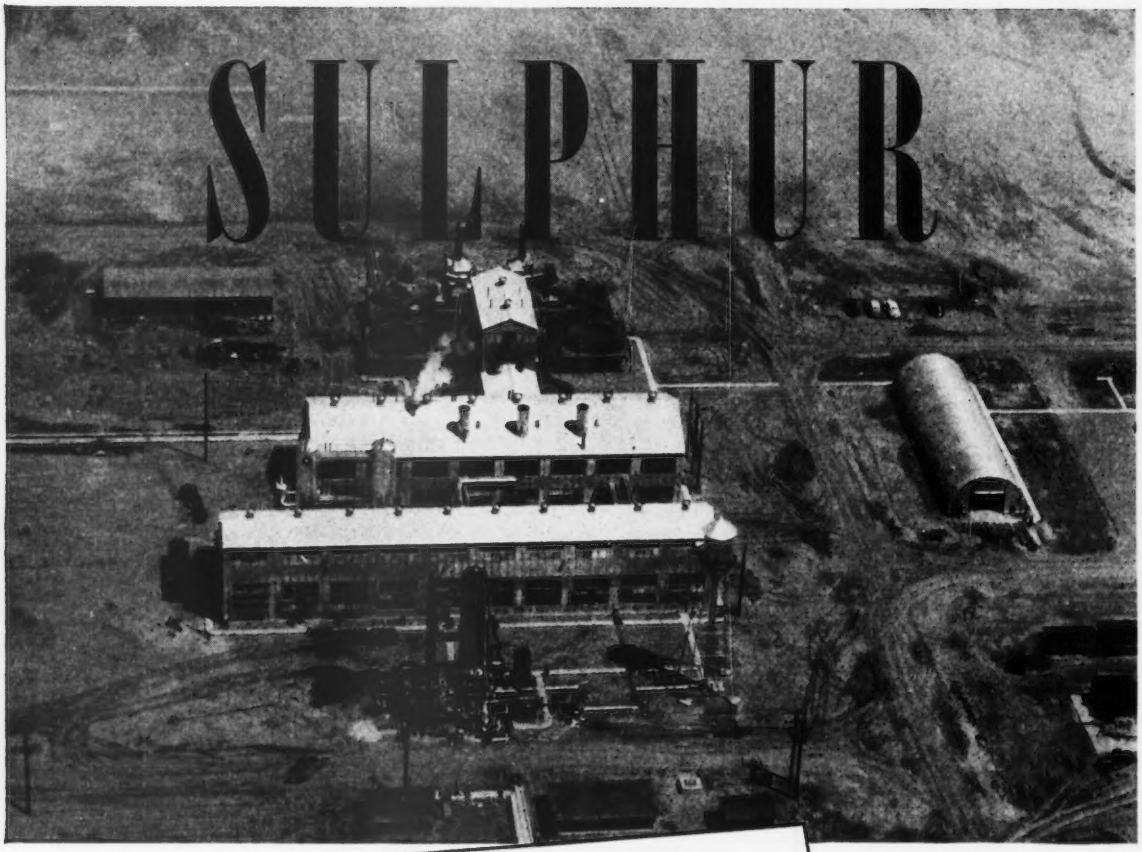
Simplex-TIREX High Voltage Portable Cable has the toughest, most abrasion-resistant jacket known. It is designed and engineered especially for mining requirements. It is the only trailing cable made with the famous Selenium Neoprene Armor and is cured in lead. Used to transmit power to shovels, dredges, cranes, and draglines, it is resistant to moisture, acids, alkalies, oil, flame, and sunlight.

If you're not now using Simplex-TIREX Trailing Cable, write for Catalog 1012 to the address below, or contact your nearest Simplex representative.

Simplex WIRES & CABLES

TIREX CORDS AND CABLES *are made only by the*

SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.



Sour Gas (H_2S) Sulphur Recovery Plant, Worland, Wyoming.

Sour Gas...

...an increasingly important source

The largest elemental sulphur producing area in the world today is a narrow belt along the Coast of the Gulf of Mexico. Large quantities of elemental sulphur lie in natural beds in Japan, Italy, the Andes Mountains of South America, as well as many other sections of the world.

Most of the natural gas coming from fields on the East slope of the Rocky Mountains contains hydrogen sulphide rendering the gas "sour." The recovery of the sulphur from this gas, thereby purifying it, is a feat of chemical engineering.

Both metallurgy and chemistry combine in Canada, Norway, Sweden, Spain, Portugal, Germany, Great Britain, Holland and Egypt to produce substantial quantities of elemental sulphur from sulphides of hydrogen, iron and oil shale.

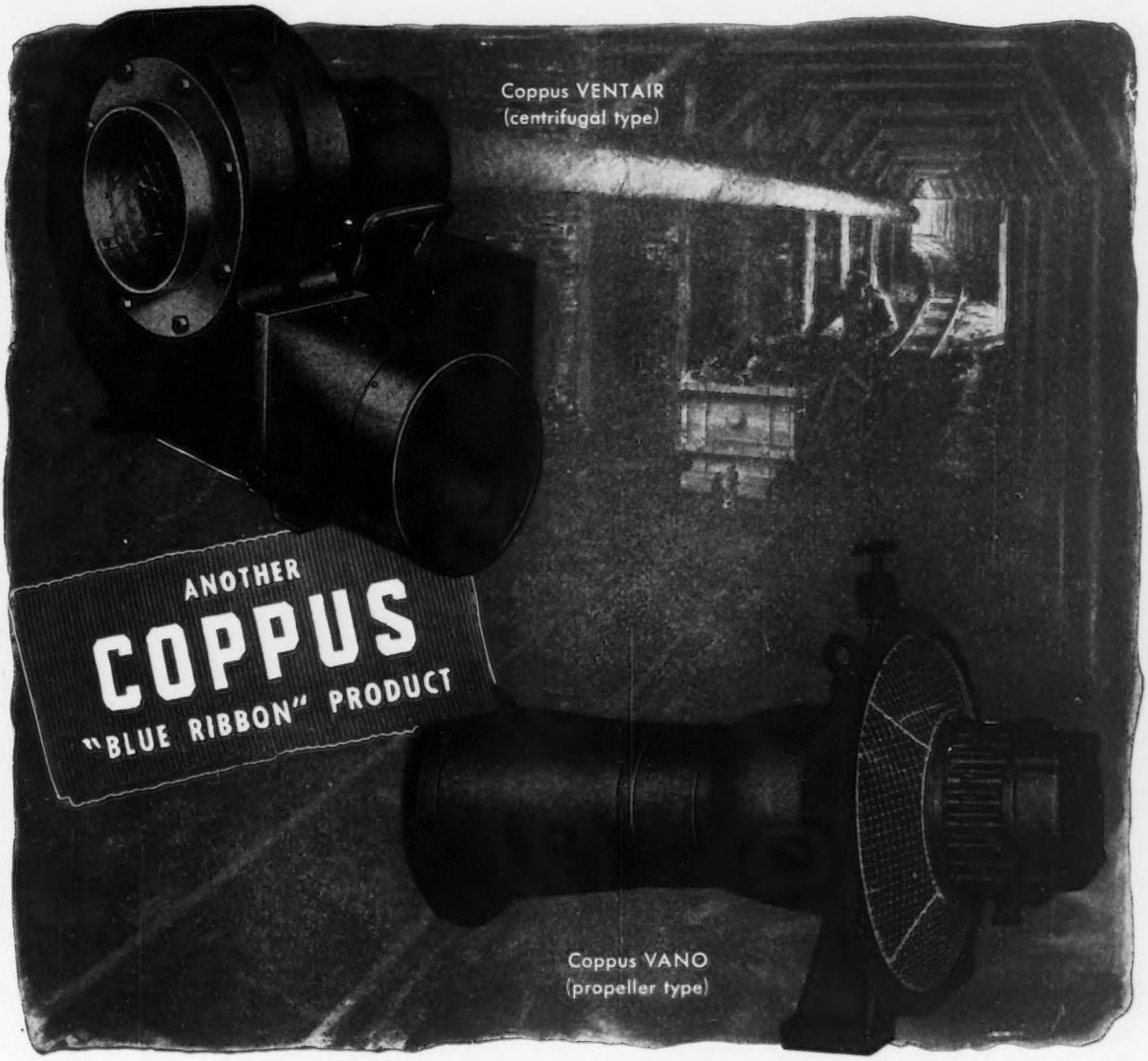
This company has the largest single unit in the world at Worland, Wyoming, recovering elemental sulphur from hydrogen sulphide contained in sour gas.

Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.

Sulphur Producing Units

- **NEWGULF, TEXAS**
- **MOSS BLUFF, TEXAS**
- **SPINDLETOP, TEXAS**
- **WORLAND, WYOMING**



Two Blowers . . . One Purpose: 30 to 100% More Air

Why two totally different blower types? Because the requirements of mine ventilation fall into two entirely different categories.

For high pressures, long pipe lines, use the Coppus VENTAIR® (centrifugal type). For medium pressures, shorter pipe lines, the Coppus VANO® (propeller type) is best. One or the other will give you more air per given power consumption than other blowers — from 30% to 100% more. Can be used as blowers or exhausters, capacities up to 90,000 CFM, with compressed air or electric motor drive.

Only Coppus makes both types. And, for quick recognition, each wears the famous "Blue Ribbon", distinguishing mark of top-quality engineering, materials and performance. This blue band is your guarantee of better mine ventilation . . . Look for it.

Representatives listed in MINING CATALOGS. Other Coppus "Blue Ribbon" products: steam turbines, gas burners, heat killers, air filters, blowers and exhausters for special purposes. See also THOMAS' REGISTER . . . Coppus Engineering Corporation, Worcester 2, Mass.

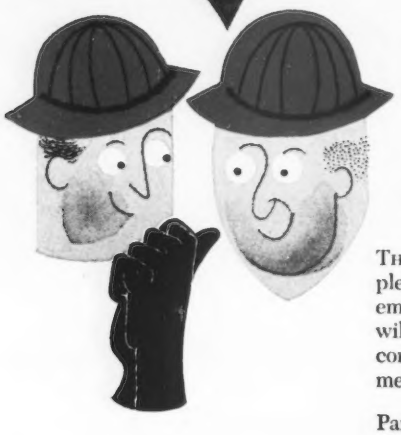
COPPUS ENGINEERING CORPORATION
283 Park Avenue, Worcester 2, Mass.

Please send: Bulletin 130.

Name.....

Company.....

Address.....

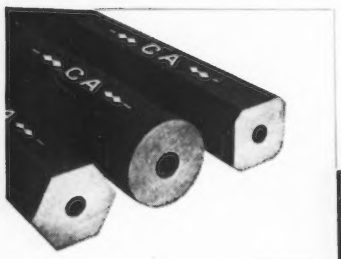


they're using CRUCIBLE HOLLOW DRILL RODS at FOLSOM DAM

THE FOLSOM DAM project is a big construction job. When completed it will be 340 feet high, 1400 feet long – with wing embankments extending for more than two miles. The new dam will provide a source for irrigation and power, and serve to control flood conditions in the American River Basin near Sacramento, California.

Part of the construction work involves the excavation of more than 9 million cubic yards of earth and rock. Here's where Crucible Hollow Drill Rods are playing a mighty important role. They can't be beat when it comes to hard rock drilling operations.

Crucible Hollow Drill Rods are made to tool steel standards by the world's largest producer of tool and other special purpose steels. This *extra* quality assures you of minimum rod breakage . . . and fewer valuable bit losses. For dependability in rock drilling, buy Crucible Hollow Drill Rods.



CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking

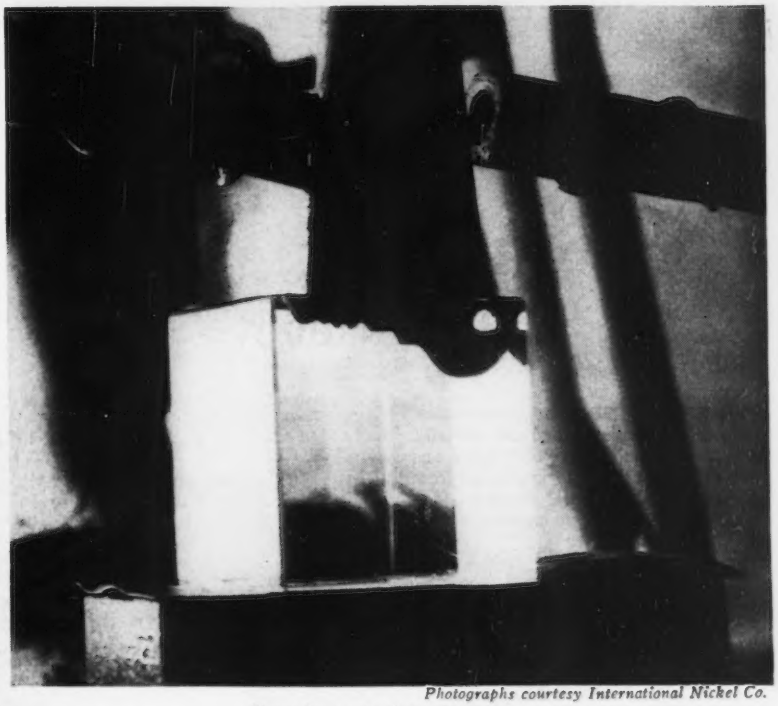
HOLLOW DRILL ROD

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

E&MJ NEW PRODUCTS DIGEST

FEATURE



Photographs courtesy International Nickel Co.

Brass key cuts through glass.

Transducer head of the Cavitron, sheathed in 18-8 chromium-nickel stainless steel, contains water-cooled magnetostrictive nickel plates which drive 27,000 vibrations per second through the tool holder.

Inaudible Sounds Cut Hardest Materials

THE CAVITRON, according to *Nickelsworth*, a magazine of the International Nickel Co., uses sounds you cannot hear to cut shapes and holes in the hardest materials known, yet the cutting die can be a piece of softer metal.

Ultrasonic vibrations start inside the transducer head, where nickel plates shrink 1,620,000 times a minute under the influence of electro-magnetism. Vibrations pass down through a Monel toolholder to a cutting implement brazed on the end. Then they enter a stream of water which carries microscopic particles of abrasive. Vibrations drive the abrasive against the piece which is to be cut, so that you have the effect of millions of microscopic chisels.

Still in the experimental stage, Cavitron is already being used in making parts for aircraft, electronic, and jewelry industries. It can pierce holes with a tolerance of 0.0003 in. in the hardest materials.

Manufacturer is Cavitron Equipment Corp., Long Island City. *E&MJ* is indebted to *Nickelsworth* for this report of one of industry's newest tools. **(1)**

For broken rock . . .

For large boulders . . .

For heavy scrap . . .

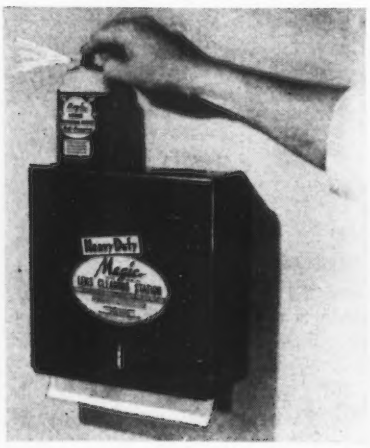
New Grapple Offers Speed and Efficiency

WITH EACH TINE acting independently both in pinching the load and laterally, the Schedit grapple offers both speed and efficiency in handling anything from broken rock to structural members. For shaft sinking it offers tremendous advantages over conventional clamshells in obtaining mucking rates as high as 26 cu yd per hour.

While the accompanying photographs depict cable-operated units, an improved model using an air cylinder is now available in sizes up to about 1½ cu yd.

In shaft sinking the grapple works from a stage which carries the compressed air equipment, drum and revolving crane for directing the grapple. It can be operated from the platform or from the bottom of the shaft. Since tines have some play from side to side, boulders are no problem. Sizes from 0.4 to 3.3 cu yd.

Sole agents in the United States are Ruhr Industries, Philadelphia, Pa. For more information on this remarkable piece of equipment, circle No. 2 on the postage-free reply card opposite page 42 and mail. **(2)**

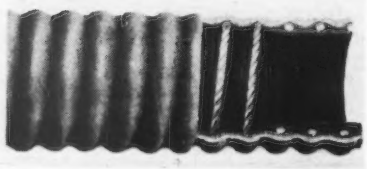


LENS-CLEANING STATION

To keep your employees from going around in the fog of uncleaned goggles, Silicone Paper Company of America, New York, N. Y., is offering a heavy duty lens cleaning station. Cleaning fluid comes in pressurized cans holding 1400 applications. Dispenser feeds wiping sheets one by one, costs $5.95. Fluid is $12.50 per carton of twelve 12-oz cans. Carton of 18 tissue refills (760 king-size sheets) costs $11.60. **(3)**

TRACTOR SHOVEL

Six separate models of a tractor shovel or front-end-loader will be marketed under the trade name "Michigan Tractor Shovel" by Clark Equipment Co., Buchanan, Mich. With capacities from 15 cu ft to 2¼ cu yd, all models will have torque converters. **(5)**



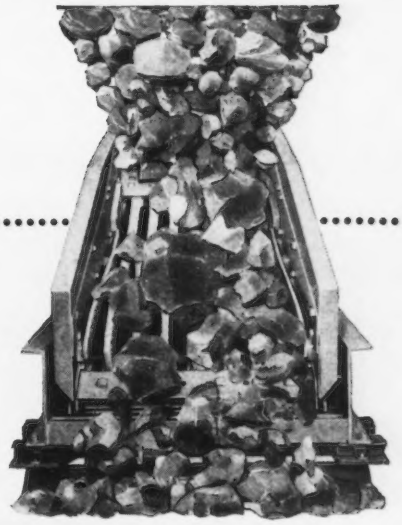
SUCTION HOSE

Replacement of wire by a specially treated hard twisted cord gives this hose the ability to recover its original shape after it has been crushed or run over. Sizes range from 1 to 3 in. in diameter. Hamilton Rubber Mfg. Corp., Trenton, N. J. **(4)**

SYMONS VIBRATING BAR GRIZZLIES

. . . up to 500 tons per hour handling feeds ranging to power shovel size

The SYMONS Type-K vibrating manganese Bar Grizzly is recommended for large tonnage *Scalping* of ore, rock or gravel. The powerful vibrating action of the Bar Grizzly makes it particularly effective for wet, sticky or gummy materials. The sloping, curved bars of the Symons Bar Grizzly tend to cascade the material as it passes over the screening surface. The tumbling action effectively assists in separating the undersize. Will handle feed sizes up to 30″ and larger.



For full details about the SYMONS BAR GRIZZLY, send for BULLETIN 121A.

FOR HEAVY DUTY SCALPING SERVICE

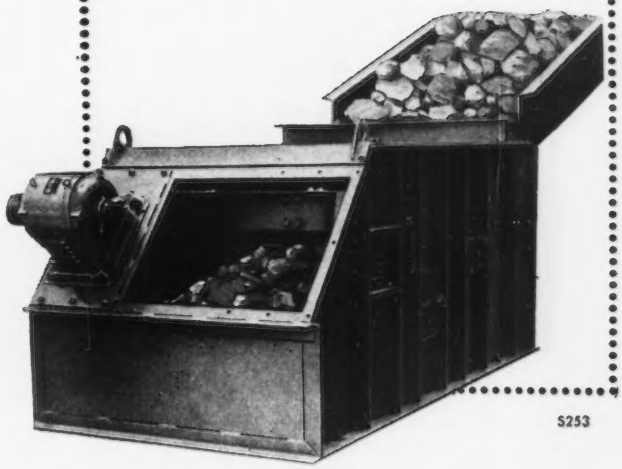
For full details about the SYMONS ROD GRIZZLY, send for BULLETIN 207.

SYMONS VIBRATING ROD GRIZZLIES

. . . up to 500 tons per hour for feeds up to 10″ — 12″

The SYMONS Type-K—RG vibrating Rod Grizzly is built for heavy duty scalping service in large tonnage operations . . . bridging the gap between primary breaking and the secondary crushing and screening operations. It can readily handle dry, wet, sticky or gummy ores and rock. Some of the important features include:

Abrasion resistant heavy spring steel rod screening surface; Long lasting, low cost rods are easily adjusted or replaced; Effective, vigorous vibration provides thorough scalping; Amplitude of vibration can be quickly and easily changed to meet various operating conditions. Ideally suited for service following most sizes of primary crushers and scalping operations requiring relatively coarse separations in the range between 1″ to 4″.



S253

SYMONS . . . A Registered Nordberg Trademark Known Throughout the World

NORDBERG MFG. CO., Milwaukee, Wisconsin

SYMONS GYRATORY CRUSHERS

SYMONS CONE CRUSHERS

MINE HOISTS

SYMONS "V" SCREENS

GRINDING MILLS

DIESEL ENGINES

NORDBERG MACHINERY

NORDBERG

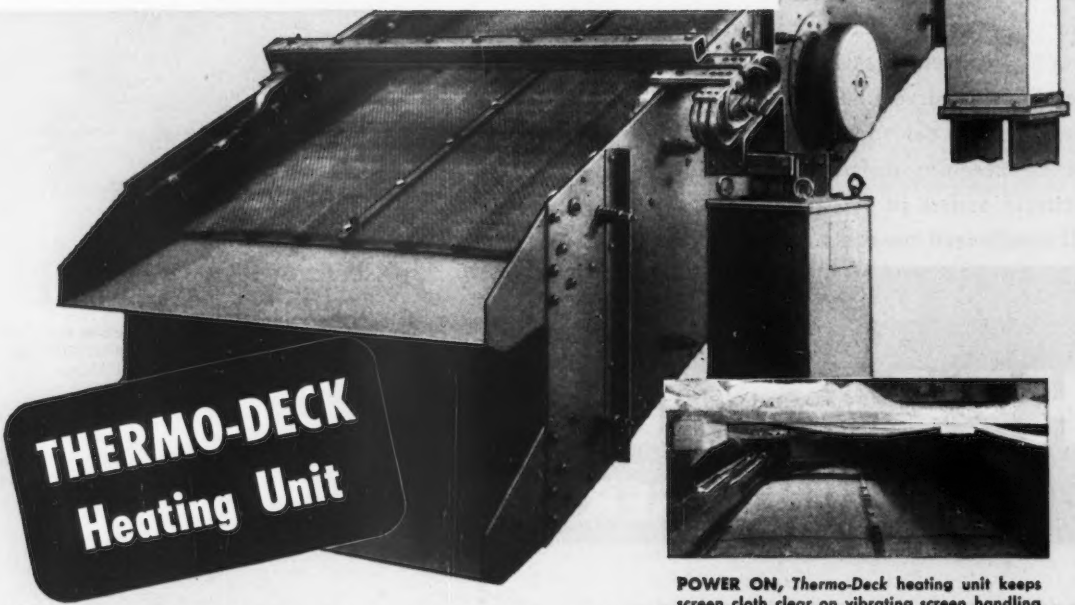
"SYMONS" SCREENS NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

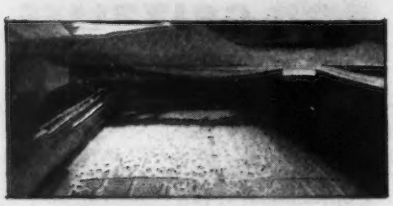
NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON • TORONTO
MEXICO, D.F. • LONDON • PARIS • JOHANNESBURG

Stops Blinding

Increases Capacity — Cuts Screening Costs



POWER ON, *Thermo-Deck* **heating unit keeps screen cloth clear on vibrating screen handling fine, moist material.**



POWER OFF, troublesome blinding occurs. This view shows same screen as above, with *Thermo-Deck* unit shut off.

You can screen fine, moist material *continuously* with a *Thermo-Deck* heating unit. No down time required to clear fine or medium mesh screen cloth!

Heated screen cloth remains open . . . you get *more* tonnage through the screen and better separation.

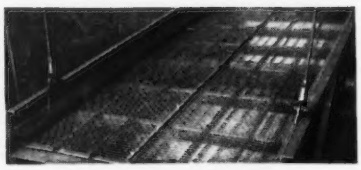
Operating records prove that heated wire cloth screens last up to three times longer than non-heated cloth, because they do not have to be pounded free of blinded material. For the same reason, you save man-hours too. These lower costs increase your profits.

The *Thermo-Deck* unit can be applied to Allis-Chalmers screens in the field. See your nearby Allis-Chalmers representative for complete details. Or write Allis-Chalmers, Milwaukee 1, Wis., for Bulletin 07B7812.

A-4272

For Intermittent Feed... ADD A *STA-KLEEN* DECK

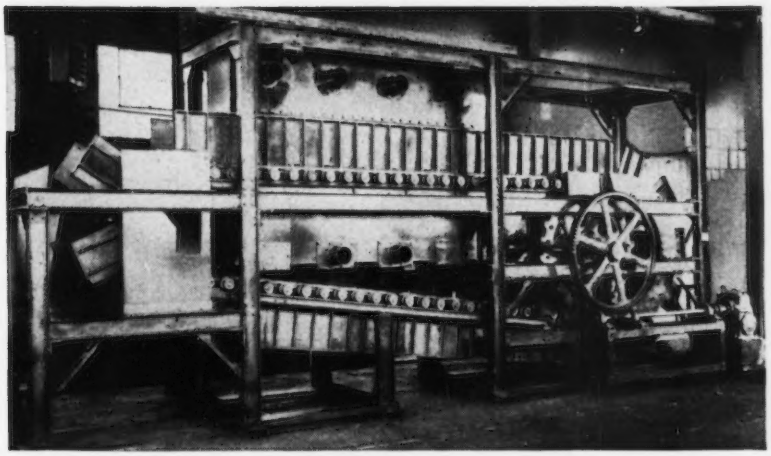
If feed is intermittent, fine material may bake on the wire cloth during interruptions in feed. Heat which ordinarily is absorbed by moist material increases the temperature of the wire cloth sufficiently to cause any fine material to bake on. The addition of a *Sta-Kleen* deck effectively prevents this. Bouncing rubber balls between the screen cloth and a ball retaining deck clear the cloth of baked-on particles.



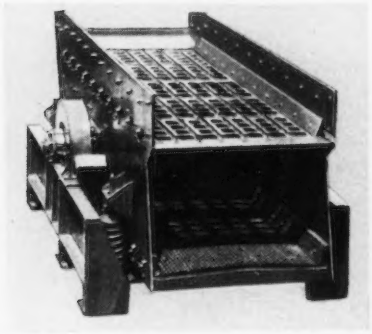
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Thermo-Deck and Sta-Kleen are Allis-Chalmers trademarks.

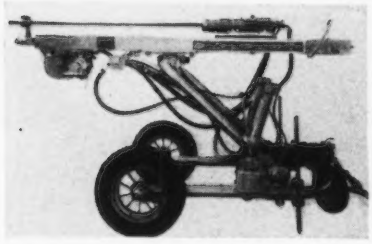


PILOT SINTERING MACHINES built by Sintering Machinery Corp., Netcong, N.J., include all the features of the larger Dwight-Lloyd production machines, and are capable of operation by down draft or up draft. This unit has a hearth area 24 in. wide and 9 ft long. Top or bottom ignition, layered charging and other developments under investigation in research centers, have been provided for. **(6)**



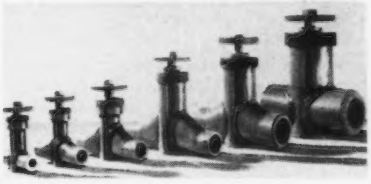
VIBRATING SCREENS

Redesigned for heavier duty and more efficiency, "Mesabi" type vibrating screens, built by Pioneer Engineering Works, Inc., Chicago, Ill., are now available in single- and two-deck units: 4 ft wide, 10 or 12 ft long; 5 ft wide, 10, 12 or 14 ft long; 6 ft wide, 12 or 14 ft. long. **(7)**



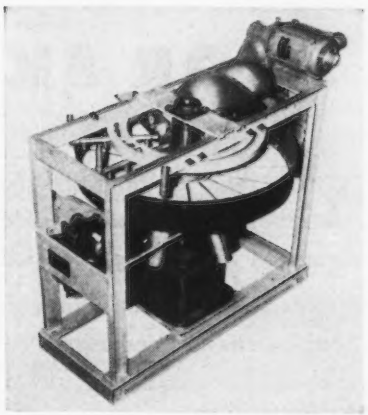
WAGON DRILL

To save time and effort in spotting holes, Gardner-Denver Model URM wagon drill is mounted on a wagon with dual hydraulic lift. The two lifts quickly raise or lower the U-bar while the drilling mast is being maneuvered into position. The wagon carries the chain feed and heavy-duty 4-in. drill. Gardner-Denver Co., Quincy, Ill. **(8)**



POLYVINYL-CHLORIDE VALVES

For your anti-corrosion arsenal, these needle and globe valves, made of Boltaron 6200 unplasticized polyvinyl-chloride, are available in quantity from H. N. Hartwell & Son, Inc., Boston, Mass., in sizes from ⅛-in. to 2 in. **(9)**



VACUUM FILTER

Designed for simple and efficient filtering of coarse crystalline materials, fibrous pulps and other free filtering applications, this new FEinc horizontal rotary vacuum filter offers high capacity, fast dewatering and good cake washing. Full details are available from Filtration Engineers, Inc., Newark, N. J. Use postage-free reply card opposite p. 42 to obtain further information. **(10)**

what's NEW in Engineering

A new concrete curing process, being tested by the New Jersey Highway Department, may speed the building of bridges and viaducts. It permits the wooden forms supporting wet concrete to be removed in 60 hours instead of the usual 14 days. After the concrete is poured into the forms, 3-foot square mats are laid on top and vacuum hoses are used to draw off excess water. This cures the concrete in a fraction of the time formerly required.

A sinking plant, and what to do about it, was one unusual assignment given Kaiser Engineers. A large area of land on which the tidewater plant was located had sunk six feet in twelve years: the dock loading area had become unusable at high tide. To solve the problem, Kaiser Engineers re-designed the dock area to increase its height and make it serve as a coffer dam to keep the water from affecting the round-the-clock operations of the mill. Tight construction scheduling was a must because of ship traffic and high tides.

Nuclear Engineering is the title of a new book, due this month, by Richard Stephenson, Consulting Chemical Engineer. This is the first book to bring together the many unique engineering problems encountered in the nuclear energy field.

Whatever your immediate research, design or engineering problems, however unusual they may be, an early consultation with Kaiser Engineers is an important step toward their quick, profitable solution. Call or write Kaiser Engineers Division of Henry J. Kaiser Company, Kaiser Building, Oakland 12, California.

LUCK . . . . OR SKILL?

YOU can't tell from one shot. An expert marksman earns his rating by *repeated* hits. Here at McKee we have earned our reputation for doing a good job by repeatedly *doing a good job.*

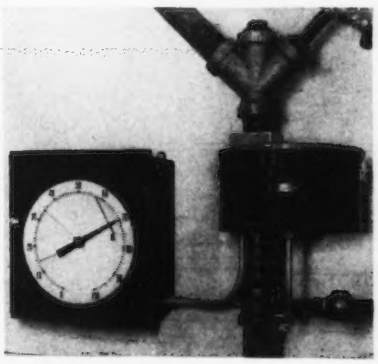
McKee services mean correct design, sound engineering, expeditious purchasing and efficient construction . . . in short, a plant that's designed and built to earn a profit.

McKee Engineering Services

Arthur G. McKee & Company • Engineers and Contractors

Headquarters: McKee Building • 2300 Chester Avenue • Cleveland 1, Ohio
Offices: New York • Tulsa, Oklahoma • Union, N. J. • Washington, D. C.
British Representatives of Metals Division: Head, Wrightson & Co., Limited
Canada: Arthur G. McKee & Company of Canada, Ltd., 350 Bay St., Toronto

STEAM CLEANER can do a complete cleaning job on a dozer or tractor in 2 hr. Competent cleaning before greasing has been reported to double life of rollers. Malsbary Mfg. Co., Oakland, Calif **(11)**

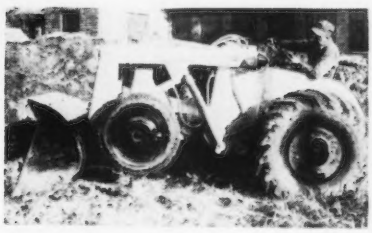


TURBIDIMETER

This recording turbidimeter, which continuously and automatically measures and permanently records the number of particles suspended in liquids, is available from General Electric Co.'s Special Products Section, Schenectady, N. Y. **(12)**

QUIET PLEASE

Those things that look like orange crates hanging around, are actually portable, lightweight, easy-to-install, sound absorbing units known as "Sonosorbers." Their purpose is to cut down industrial noise economically. You can get the details from Sonosorber Corp., East Orange, N. J., by using the reply card opposite p. 42. **(13)**



LOADER

Improvements on this hydraulic power-crowd loader now permit it to exert a forward thrust of 15,000 lb while unit is standing still. It will dig 12 in. below wheel level and can handle ⅝ to 1¼-yd buckets. Lessman Mfg. Co., Des Moines, Ia. **(14)**

FAST TRUCK

Dart Truck Co., Kansas City, offers this 10-ton unit as a fast heavy-duty truck. With a 100-in. wheelbase, it can turn on a radius of 20 ft. Power plant is a 156-hp Continental diesel engine. It dumps in 10 seconds. **(15)**

ARE YOU DATED?

Is YOUR surveying instrument a relic of another era?

In 1752
a forward looking surveyor, named George Washington, used the best instruments of his time.

In 1954
PROGRESSIVE SURVEYORS
use modern WILD instruments for matchless precision and operational speed . . . for Substantial MAN-HOUR SAVINGS!

★ ★ ★

Set Yourself "Up to DATE"
MAKE A DATE WITH OUR DEMONSTRATION STAFF
to handle a modern WILD instrument. We will arrange to show you the unmatched performance of WILD Transits, Theodolites, Levels and other surveying equipment...in action under field conditions.

★ ★ ★

® WILD HEERBRUGG has THE MOST SUITABLE modern surveying instrument for your specific job or for universal application. WILD instruments are known throughout the world for:

★ Ease and speed of handling
★ Fool-proof design and maximum reliability
★ Lasting trouble-free operation
★ Light-weight, rugged construction
★ Simplicity of collimation and level vial adjustments

See For Yourself! Contact Dept. EM 3

MAKE A DATE WITH WILD...the world's largest manufacturer of precision surveying instruments.

Full Factory Service by Specialists

HENRY WILD
SURVEYING INSTRUMENTS SUPPLY CO.
OF AMERICA, INC.
MAIN & COVERT STS., PORT WASHINGTON, N. Y.
POrt Washington 7-4843

ore cars really keep rolling on AMSCO

manganese steel wheels

five years continuous service without replacement

Five years ago a mining company equipped thirty ten-ton ore cars with Amsco Manganese Steel wheels. Not one has had to be replaced because of wear or breakage! Here is why Amsco products made of Manganese Steel, "the toughest steel known," lasts:

1 Work-hardens under impact to as high as 450-550 Brinell.

2 Surface polishes to reduce wear and minimize lubrication.

3 12 to 14 percent Manganese for strength and ductility.

and it's easily weldable with Amsco Hardfacing Alloys

Write Amsco or ask your ore car builder for information on how Amsco Manganese Steel wheels can help you keep production rolling.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION

373 East 14th Street · Chicago Heights, Ill. OTHER PLANTS: NEW CASTLE, DEL., DENVER, OAKLAND, CAL., LOS ANGELES, ST. LOUIS. IN CANADA: JOLIETTE STEEL DIVISION, JOLIETTE, QUE. AMSCO WELDING PRODUCTS DISTRIBUTED IN CANADA BY CANADIAN LIQUID AIR CO., LTD.

For Your Files

This informative manufacturers' literature is free unless otherwise specified. To obtain bulletins circle their numbers on card below and mail.

JACKDRILL. Ingersoll-Rand Co., New York, N. Y., offers a 12-page booklet on the JR-38 Universal Jackdrill. Bulletin shows construction, how it can be used to best advantage in your mining operations. (51)

DENSITOMETER COMPARATOR. An 8-page bulletin with line drawings and photographs describes and illustrates a handy device for measuring breaks of an exposed photographic plate, an important accessory for spectographic analysis. (52)

LAND TRANSPORTATION. Not particularly of prime importance to mining men in the near future, but nevertheless an interesting account of The Alweg System of Land Transport is given in a picturesque folder issued by Alweg-Forschung GmbH., Koln. This is the widely publicized monorail system for railroads. (53)

HYDRAULIC MOTORS. If you want to know about hydraulic motors in general and those made by Vickers, Inc., Detroit, Mich., in particular, circle number 54 on the postage-free reply card and get a copy of Bulletin M-5103, which tells all about them with cutaway views, blueprints and performance charts. (54)

ROLLER CHAINS. A 57-page booklet gives all the information that you need for obtaining cast steel chains from the Rex Chain Belt Co., Milwaukee, Wisc. In addition to engineering data and specifications on chain, catalog 53-110 has information on cast iron and spray nozzles. (55)

CONVEYOR CARRIERS. A 4-page folder gives engineering information and describes advantages of the 220 series of "Simplex" belt conveyor carriers made by Stephens-Adamson Mfg. Co. (56)

WELDING ELECTRODES. Catalog 1318 is a well indexed pocket guide to welding electrodes made by Air Reduction. The welding foreman and your master mechanic should find this guide very useful. (57)

PNEUMATIC CONTROL ACCESSORIES. Catalog 8950 is a well illustrated folder with photographs and line drawings that tells you the type of information you want to know about pneumatic control accessories for more accurate control, full flexibility and minimum maintenance. Minneapolis-Honeywell Regulator Co., Philadelphia, Pa. (58)

POLYVINYL CHLORIDE. The mechanical, electrical and thermal properties of "Boltaron 6200" a non-plasticized polyvinyl chloride are given in this 6-page folder as well as the applications where you can use it to advantage in reducing corrosion. Hartwell & Son, Inc., Boston, Mass. (59)

FLOTATION MACHINES. A 4-page folder from Booth Engineers, Salt Lake City, Utah, permits you to take a good close look at the new Booth Flotation Machine. (60)

WELDING. Linde Air Products Co., New York, N. Y., has put out a sizeable and comprehensive bulletin on modern methods of joining metals. Mining and milling men will find a lot of their problems discussed in this. (61)

CRANE PARTS. The Tool Steel Gear and Pinion Co., Cincinnati, Ohio, shows off their axles, gears and pinions, sheave wheels and brake wheels for use in your cranes, tractors and shovels. (62)

ELECTRIC RESISTORS. Here is a 2-page sheet on resistors for mine locomotives for filing in your loose leaf booklet on mine locomotives. It shows the resistor itself and gives the advantages of its use. Guyan Machinery Co., Logan, W. Va. (63)

ONE-MACHINE MACHINE SHOP. Newage International, Inc., illustrates the various applications of its "New Universal" machine which they call a complete machine shop in one machine. Included in the applications illustrated are cylindrical grinding, tool & cutter grinding, surface grinding, disc grinding, internal grinding, vertical and horizontal milling, boring and drilling, disc filing, turning, abrasive wheel cutting off, slotting and band sawing. Small miners might find this handy for their shops. (64)

FLEXIBLE COUPLINGS. Design and construction, dimensions and advantages of flexible couplings manufactured by Lovejoy Flexible Coupling Co., Chicago, Ill., are given in this bulletin, No. 1099. (65)

AIR HOISTS. A 100-lb. air hoist that offers variable speed control, ease of operation, no spark hazard and rugged construction. Demonstrated in the 6-page folder from Aero Equipment Corp., Bryan, Ohio. (66)

ALUMINUM SHAKER CONVEYOR. An aluminum conveyor that is easy to adapt, assemble, handle and maintain is described in the 4-page folder from Frontier Bronze Corp., Niagara Falls, N. Y. This conveyor was previewed in New Products Digest for October 1952. (67)

ROOF BOLTS. An informative 4-page booklet on use of bolts is available from West Virginia Steel & Mfg. Co., Huntington, W. Va. (68)

ROLLER BEARINGS. Just about everything you want to know about Cooper split roller bearings is covered with tables, drawings and photographs in an 18-page catalog from the Cooper Split Roller Bearings Corp., Pittsburgh, Pa. (69)

CONVEYOR BELTING. Most of the advantages of Scandura Coated Conveyor Belting are presented and well illustrated in a bulletin from the Scandinavia Belting Co., Newark, N. J. Some of these advantages are abrasion and corrosion resistance, water-proofing, improved fastener holding, stretching is negligible. (70)

USE THIS CONVENIENT CARD

to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, tear out and mail.

Not good after May 1, 1954, if mailed in the U.S. or Canada.

Engineering and Mining Journal—March, 1954
NOT GOOD AFTER MAY 1, 1954—if mailed in U. S. or Canada

Please send me the catalogs or further information about the items from New Products Digest whose numbers are circled.

1	8	15	22	29	36	43	50	57	64	71	78	85	92
2	9	16	23	30	37	44	51	58	65	72	79	86	93
3	10	17	24	31	38	45	52	59	66	73	80	87	94
4	11	18	25	32	39	46	53	60	67	74	81	88	95
5	12	19	26	33	40	47	54	61	68	75	82	89	96
6	13	20	27	34	41	48	55	62	69	76	83	90	97
7	14	21	28	35	42	49	56	63	70	77	84	91	98

My Name ..... Position .....

Company .....

Address .....

E&MJ NEW PRODUCTS DIGEST

DIESEL ENGINES. New developments in oil diesels, in dual fuel diesels, and in high compression, spark ignition engines are thoroughly covered in bulletin S-500-B55 from Worthington Corp., Harrison, N. J. (71)

LOADING EQUIPMENT. All kinds of interesting devices for loading and unloading railroad cars and ships are discussed and pictured in bulletin 253 available from Stephens-Adamson Mfg. Co., Aurora, Ill. (72)

SOIL STABILIZATION. Electro-osmosis stabilization of foundation soils is covered in a wholly scientific manner in a data bulletin published by Wellpoint Dewatering Corp., New York 54, N. Y. If you want to put up a fairly large building but are worrying about the effect of the soil, the Griffin Soil Stabilization method may be your answer. (73)

SHAKER CONVEYOR DRIVE. Goodman Mfg. Co., Chicago, Ill., offers a 2-page folder on its type L-14 shaker drive with yard room. (74)

MINERAL JIG. Denver Equipment Co., Denver, Colo., does an exceptionally fine job of presenting its selective mineral jig. Not only does it have photographs and drawings, but also shows how it actually fits into the flowsheet of various types of plants. (75)

LUBRICATION. How the Farval Centralized System can be applied in your job to eliminate lubricant wastes, save time, insure positive lubrication and pay for itself within a few months is the subject of bulletin No. 26 of Farval Corp., Cleveland, Ohio. (76)

CYCLONES. "Jet-Injection" Cyclone Thickener for use in desliming or classification is described in a 4-page folder from Heyl & Patterson. It gives you the inside story. (77)

SAND PUMPS. All valuable information on vertical sand pumps made by Denver Equipment Co., Denver, Colo., is yours for the asking and bulletin No. P10-B5. (78)

LOADERS. Tractomotive Corp., Deerfield, Ill., offers a 6-page folder on their TL-10 "Tracto Loader," with hydraulic torque converter drive and clutch-type transmission. (79)

ELEVATOR BUCKETS. Catalog No. 100 from Standard Metal Mfg. Co., Malinta, Ohio, is full of tables giving prices, capacities and other information about their elevator buckets for elevating and conveying equipment. (80)

DIPPERS. Koehring Co., Milwaukee, Wisc., describes its improved 15 ton lift capacity, ½-yd dipper, heavy duty 205 in an 8-page catalog just released. (81)

MELTING FURNACES. Lindberg Engineering Co., Chicago, Ill., has just issued bulletin No. 29 on its line of oil or gas fired, low pressure air "Simplex" melting furnaces and contains specifications, diagrams, performances and other technical data. (82)

MAINTENANCE CONTROL. Allis-Chalmers Mfg. Co., Milwaukee, Wisc., has published an extremely useful booklet on maintenance of electric motors. This is a must for the maintenance men in your organization. (83)

LIQUID LEVEL CONTROL. A 24-page bulletin No. 1160 describes many different systems for measuring and controlling liquid level. Different sections cover measurement, control and handling of difficult liquids. Minneapolis-Honeywell Regulator Co., Philadelphia, Pa. (84)

FLEXINEERING. This is the scientific application of flexible tubing for air, oil, steam, gases, and volatiles—and it is explained in an 8-page illustrated data book just published by Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa. (85)

EVALUATING APPRENTICES. What does it cost to train apprentices? To what extent do they pay for their training by the work they accomplish during their apprenticeship? What is their potential value as journeymen after completing their training? The answers to these questions and how to determine the progress and ability of apprentices during their training are explained in a 24-page pamphlet entitled "Evaluating Apprentices" issued by the Bureau of Apprenticeship, U. S. Department of Labor, Washington, D. C. (86)

TRANSMISSION BELTING. A new catalog on rubber transmission belting has just been published by the B. F. Goodrich Co., Akron, Ohio. In addition to describing and illustrating construction features of various industrial belts, with recommended usage, the method of making the Plylock belt joint, said to eliminate the cause of nearly all belt failures, is described with accompanying illustrations. (87)

CLEANERS. Turco emulsion cleaners, according to the manufacturer, offer a very simple spray-on method of removing grease and oil from metals and machinery. Added in small amounts to petroleum solvents, they act with these solvents like soap acts with water. They increase the penetrating power of the solvents, speed the cleaning action and improve the rinsing properties. Turco Products, Inc., Los Angeles, Calif. (88)

AIR CLASSIFIER. Hardinge Co., Inc., York, Pa., has published Bulletin AH-449 describing "Gyrotor" Air Classifiers. Illustrates the operational details of the new classifier, plus operational advantages over conventional types, and flowsheets showing various applications. (89)

FLAT BELTS. Fully-illustrated bulletin featuring flat transmission belts and their applications has been released by Quaker Rubber Corp., Philadelphia, Pa. Describes complete line by listing recommended uses, specifications, construction data, sizes and lengths. (90)

TAUTLINE CABLEWAYS. Sixteen pages of photographs, sketches and text describe types, spans, working loads and other details of tautline cableways. This new 3-color catalog illustrates many applications. Sauerman Bros., Inc., Chicago 6, Ill. (91)

GAS MASKS. Bulletin No. 541, illustrating and describing canister-type gas masks has been released by Acme Protection Equipment Co., Chicago, Ill. (92)

FIRST CLASS
PERMIT NO. 64
(Sec. 34.9, P.L.&R.)
NEW YORK, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in The United States

Postage Will Be Paid By—

McGRAW-HILL PUBLISHING CO., INC.
ENGINEERING & MINING JOURNAL
330 WEST 42nd STREET
NEW YORK 36, N. Y.

USE THIS CONVENIENT CARD

to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, on reverse side, tear out and mail.

Facts prove the economy of RUST-OLEUM®

Apply Directly Over Sound Rusted Surfaces

Just scrape and wirebrush to remove rust scale and loose particles — then brush Rust-Oleum 769 Damp-Proof Red Primer *directly over sound rusted surface.*

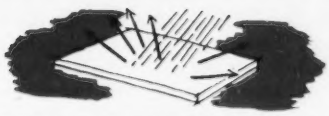
Lasts Longer Applied Directly Over Rust

Sandblasting, chemical pre-cleaning and other costly preparation methods are *not* usually required. Rust-Oleum penetrates the rust to bare metal, incorporating the rust particles into the coating.

Many Colors, Including Aluminum, and White

Rust-Oleum finish coatings incorporate the same basic rust-inhibiting vehicle as Rust-Oleum 769 Damp-Proof Red Primer. They provide *double protection* and enable you to *beautify as you protect.*

Practical Answer to Your Rust-Producing Conditions



Rust-Oleum resists rain, snow, heat, fumes, sun, salt water, and chemicals. So easy to use by brush, dip, or spray that one man often does the work of *two.*

Proved Throughout Industry for Over 25 Years

Indoors and out, Rust-Oleum has *proved* its capacity to stop rust! Rust-Oleum can do the same for your tanks, metal sash, stacks, girders, roofs, buildings, machinery, pipes, etc.

An Exclusive Formula

Rust-Oleum is *distinctive* as your fingerprint. It incorporates a specially-processed fish oil vehicle that *dries,* is *odor-free,* and is formulated in *many colors.* Specify Rust-Oleum — accept no substitutes.

There Is Only One Rust-Oleum

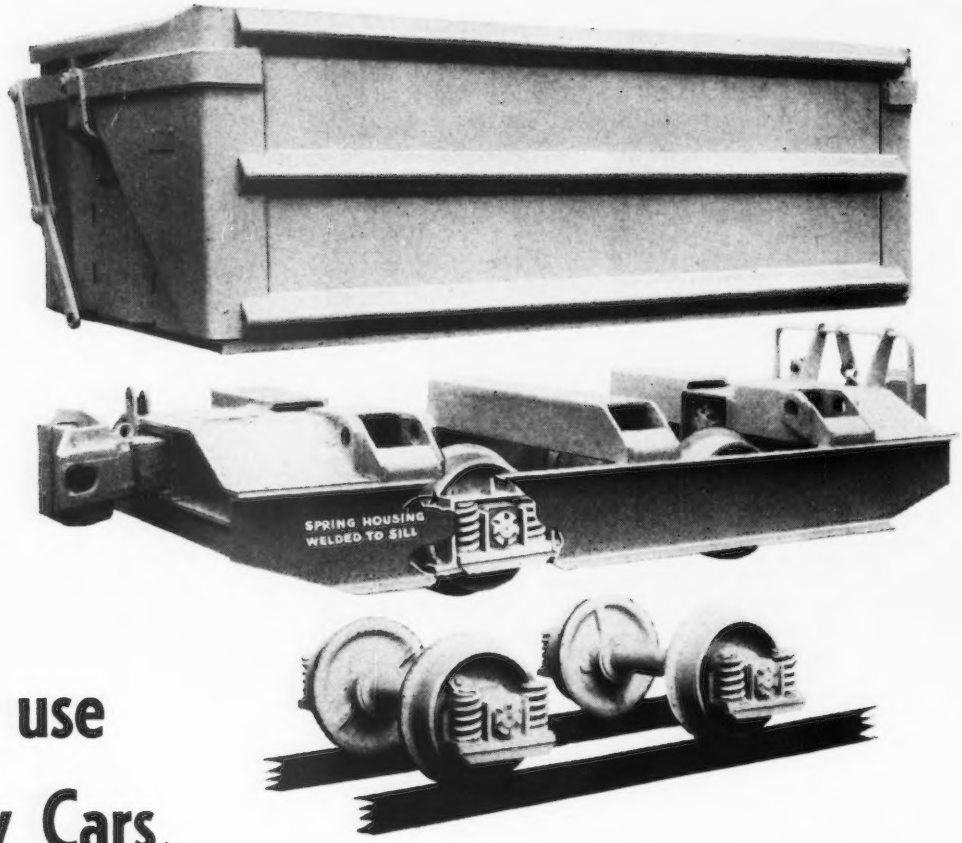
See local classified telephone directory under Rust Preventives or Paints for nearest source of supply.

RUST-OLEUM STOPS RUST!

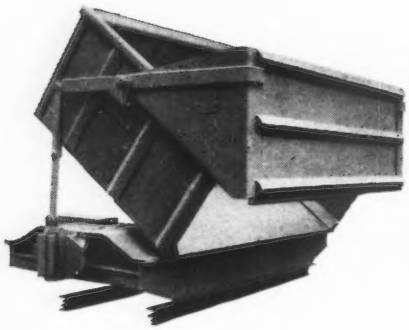
ATTACH TO YOUR LETTERHEAD — MAIL TODAY!

RUST-OLEUM CORPORATION
2447 Oakton Street, Evanston, Illinois

- ☐ Have a Qualified Representative Call
- ☐ Free Survey
- ☐ Complete Literature
- ☐ Nearest Rust-Oleum Industrial Distributor



If you use Granby Cars, here is information you should have



Gate side of this S-D Granby Car is shown above with body in dumping position and gate open. This particular car was built for a 24" track gauge. The level full capacity is 80 cu. ft. Length inside car body is approximately 9 feet. Width inside is approximately 5½ feet. Size and capacity, can, of course, be varied to suit your conditions.

Here is a new, improved Granby Car. It features: (1) outside frame undercarriage, (2) outside spring truck boxings, (3) automatic coupler mounting, (4) stronger body and (5) all-welded design in which each member serves one or more purposes.

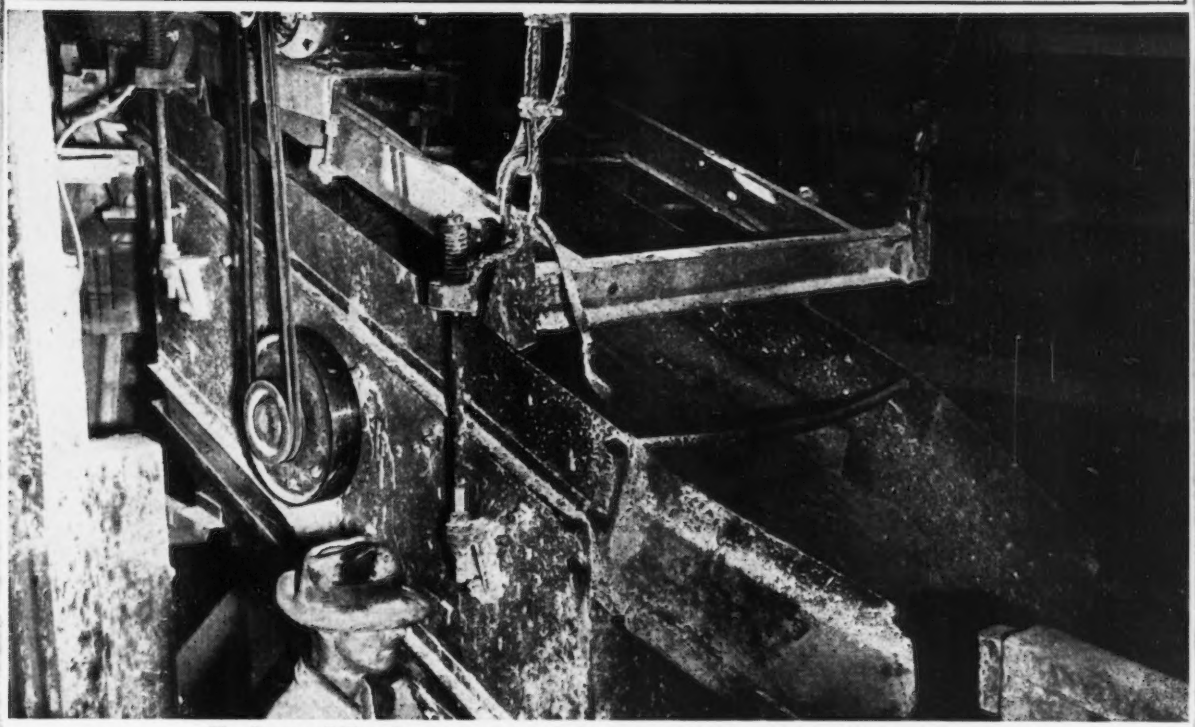
These features offer many advantages. Some are: greater capacity for any specified dimensions because body hinge points are located outside of wheels . . . better trackability and stability on narrow gauges because the low bottom and wide frame give a low center of gravity . . . easy access to all parts of truck and boxing for maintenance because entire axle, wheels, boxings and spring assembly may be dropped out of frame by removal of only eight bolts (see illustration above) . . . maximum shock absorption for any shock or load condition . . . no pinching of bearings . . . no weak spots . . . heavy ¾" bottom plate giving longer life and lower maintenance. Valley angles, gussets, vertical and horizontal stiffeners are used on the body for maximum strength. The all-welded construction is designed so that all joints and connections equal parent metal strength.

Certainly, this car answers your demands for longer car life and the lowest possible repair and maintenance costs. Let us send you complete specifications.

SANFORD-DAY IRON WORKS, Knoxville 9, Tenn.

DENVER-DILLON VIBRATING SCREENS

Complete Milling Equipment—from testing, to feeder, to dryer!



The Denver-Dillon Screen is pictured above operating in a Colorado fluorspar mill where it saves time, labor and money by giving fast, thorough size separation.

Patented Vibrating Principle of Denver-Dillon Screens Produces Fast, Clean Separation

The patented true-circle vibrating motion of the Denver-Dillon Screens provides fast, thorough size separation. This true-circle action quickly stratifies the bed, gives an even flow of material down the screen, and repeatedly turns the material to aid the passage of undersize through the screen.

Vibration is uniform so there are no dead spots or violent vibrations which bounce the rock off in one or two jumps. The result is a smooth flow of lightly dancing material spread over the entire surface of the screen which gives you fast, clean screening. Save time, labor and money by getting size separation the first time over your screen.

EXTRA LONG LIFE

Both screen cloths and screen bodies have extra long life because the vibrating motion is a "true circle" motion. Entire screen travels in small perfect circles. Each screen is adjusted and set in our shops so that the flywheel mechanism is perfectly balanced for uniform true-circle vibration of the entire screen. Dependable mechanism assures continuous, trouble-free operation. Special camber bars prevent screen whipping, increase screen cloth life.

UP TO 50% POWER SAVINGS

Besides maintenance savings, the patented two-bearing principle of the Denver-Dillon Screen offers up to 50% power savings over four-bearing mechanisms. This is because the Denver-Dillon Screen is spring suspended and the shaft bearings carry only the weight of the vibrating mechanisms. The screen is suspended free to "float" and follows true circle motion with minimum of friction loss.

DELIVERY FROM STOCK

We have a stock supply of many Denver-Dillon Vibrating Screens for immediate delivery. Screen sizes range from 1′ x 2′ thru 6′ x 14′, maximum of four decks.

Write or wire today—find out how you can increase production and profits; get faster, cleaner size separation and long screen life with a Denver-Dillon Screen! **Free Technical Bulletin On Request**

Over 25 years of Flotation Engineering

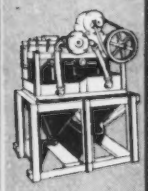
DENVER EQUIPMENT COMPANY

1400 SEVENTEENTH ST. DENVER 17, COLORADO

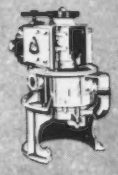
DENVER DISC FILTER

DENVER JAW CRUSHER

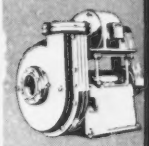
DENVER STEEL HEAD BALL MILL



DENVER MINERAL JIG

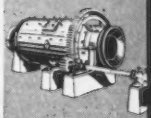


DENVER VERTICAL PUMP

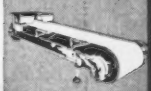


DENVER SRL PUMP

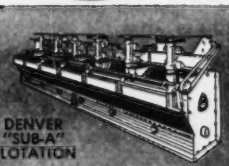
DENVER AUTOMATIC SAMPLER



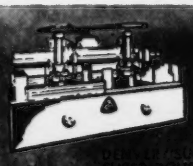
DENVER STEEL HEAD ROD MILL



DENVER ORE FEEDER



DENVER "SUB-A" FLOTATION

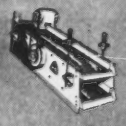


DENVER "SUB-A" SUPER ROUGHER FLOTATION MACHINE

DENVER AGITATOR AND CONDITIONER

DENVER "SUB-A" UNIT CELL

DENVER DIAPHRAGM PUMPS



DENVER DILLON SCREEN

STANDARDIZE!

ECONOMIZE!

with the bushing that's interchangeable

TAPER-LOCK

A PATENTED PRODUCT OF DODGE

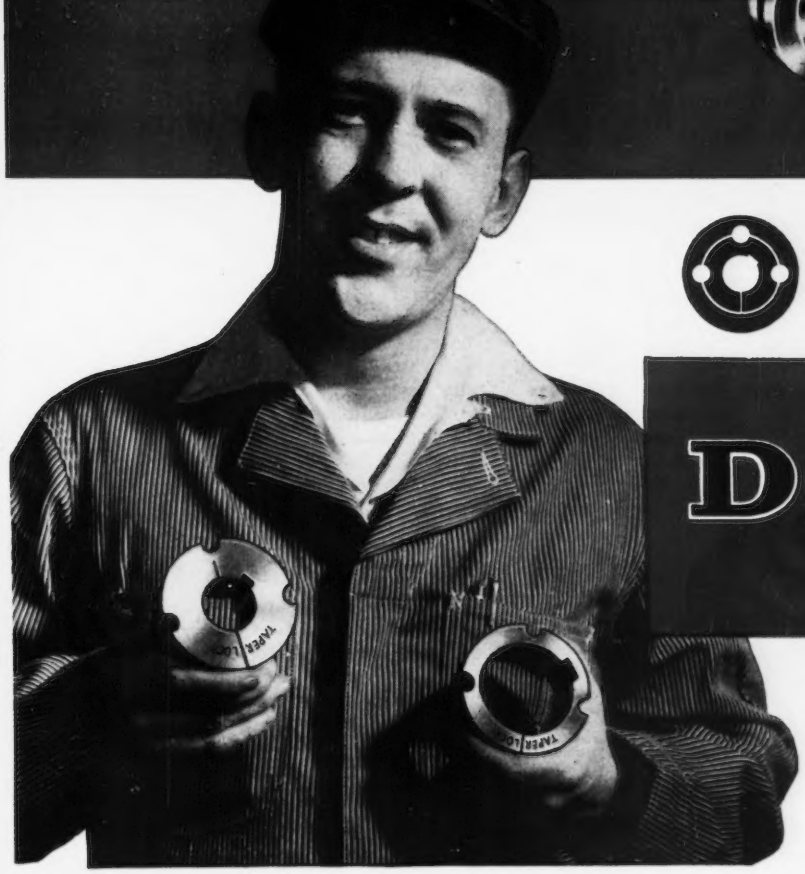
Now mount 'em all—your sheaves, sprockets, couplings, conveyor pulleys —with Taper-Lock bushings. You'll save time, save money, and keep production rolling by standardizing on these interchangeable bushings.

Taper-Lock, a patented product of Dodge, provides the simplest, surest means of mounting wheels on shafts. Dodge Taper-Lock products slip onto the shaft easily, quickly—hold with the firmness of a shrunk-on fit. They come off easily—no hammer, no crowbar, no shock to bearings or machinery.

Taper-Lock bushings fit in every one of the Dodge products pictured above. You can shift from a sprocket to a sheave, for instance, and use the same bushing. And Taper-Lock bushings are available in a range of sizes which makes changing from one size shaft to another equally easy and quick.

With a few Taper-Lock bushings you can make quicker changes and cut down-time on production machines. Get the facts now.

DODGE MANUFACTURING CORPORATION, 3100 UNION STREET, MISHAWAKA, INDIANA

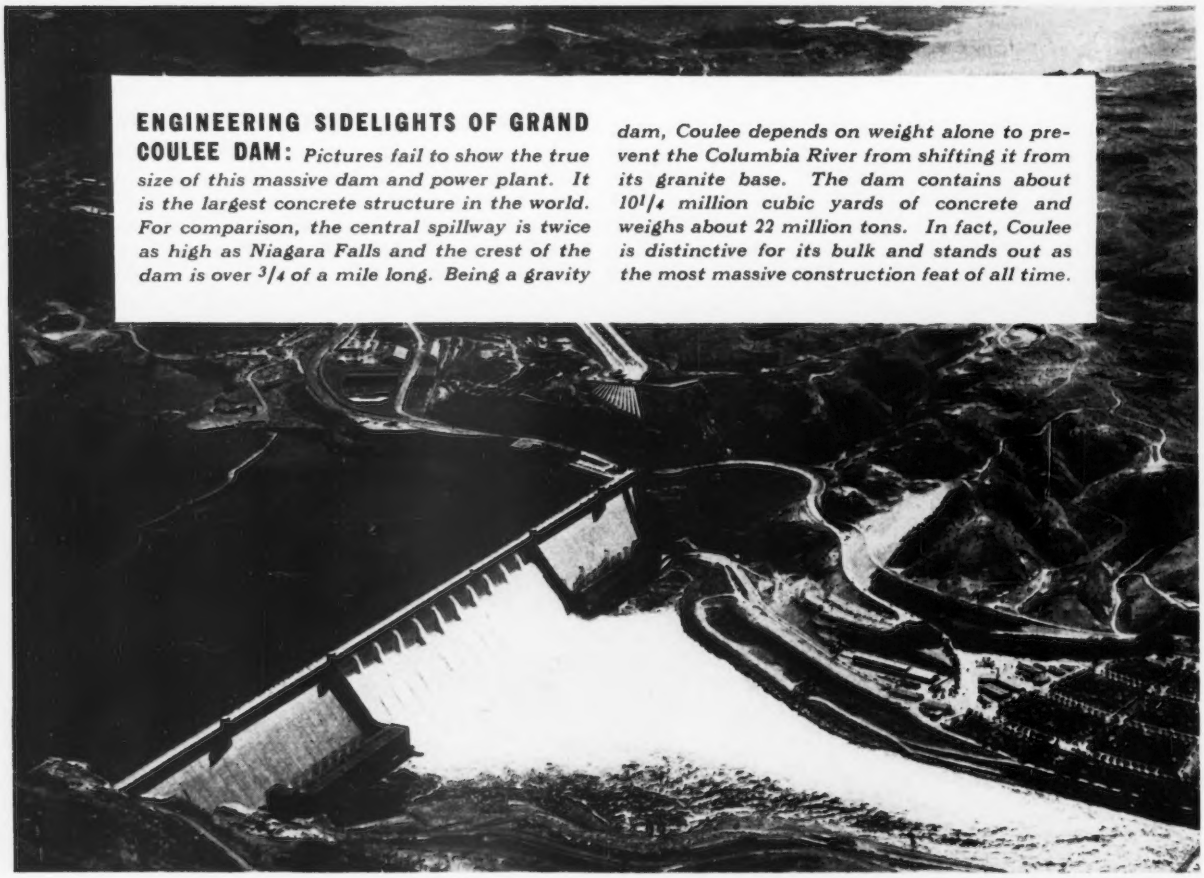


THERE'S ONLY ONE TAPER-LOCK, THE BUSHING THAT MOUNTS FLUSH!

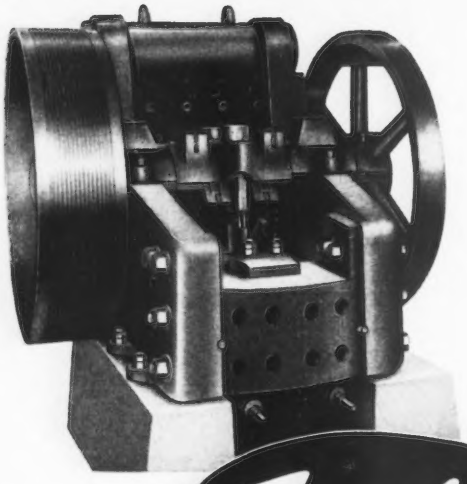
DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor, for valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified phone book, or write us.



ENGINEERING SIDELIGHTS OF GRAND COULEE DAM: *Pictures fail to show the true size of this massive dam and power plant. It is the largest concrete structure in the world. For comparison, the central spillway is twice as high as Niagara Falls and the crest of the dam is over 3/4 of a mile long. Being a gravity dam, Coulee depends on weight alone to prevent the Columbia River from shifting it from its granite base. The dam contains about 10 1/4 million cubic yards of concrete and weighs about 22 million tons. In fact, Coulee is distinctive for its bulk and stands out as the most massive construction feat of all time.*



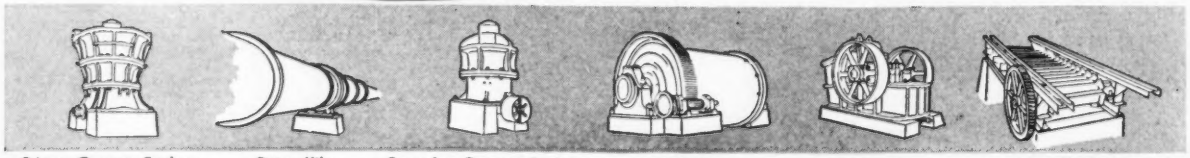
Traylor Type S Jaw Crusher
Most Massive Ever Built

Designed and built for BIG production, the largest Type S crushes up to 1,000 tons her hour of an 11" product. For comparison, it could crush a volume of rock equal to the 22 million tons of Grand Coulee in 131 full work weeks. But big production depends on more than size alone. The Traylor Type S features original curved jaw plates which apply power as a direct crushing force to reduce lifting and churning . . . assure a more uniform product with less wear on plates. In fact, Traylor curved jaw plates outlast ordinary plates 3 to 1. See the massive construction . . . exclusive design features of the Traylor Type S Jaw Crusher. It's completely illustrated and described in Bulletin 125. Send for your free copy today.

Made in 7 sizes with feed openings from 36" x 42" to 60" x 84".

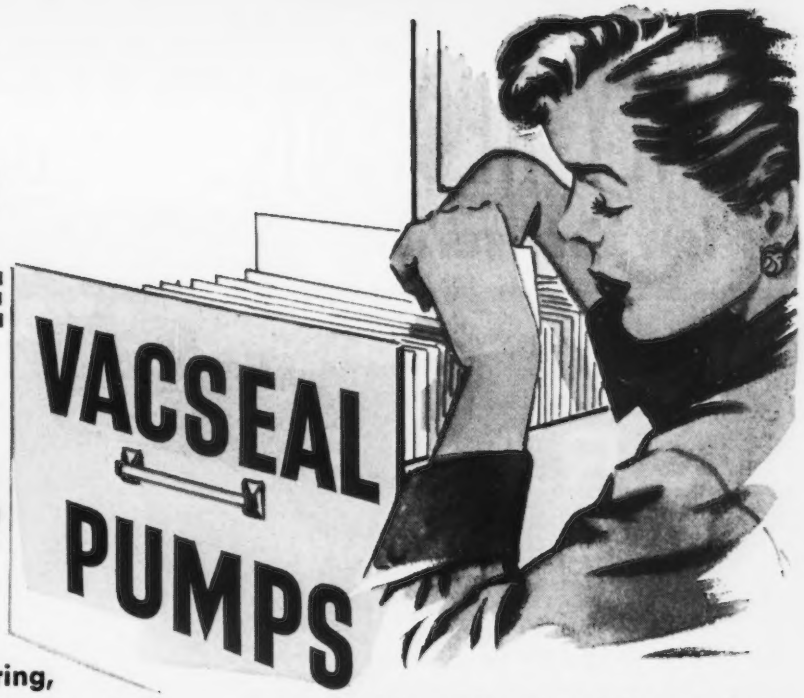
Traylor

TRAYLOR ENGINEERING & MFG. CO.
622 MILL ST., ALLENTOWN, PA.
SALES OFFICES: New York • Chicago • San Francisco
CANADIAN MFRS: Canadian Vickers, Ltd., Montreal, P. Q.

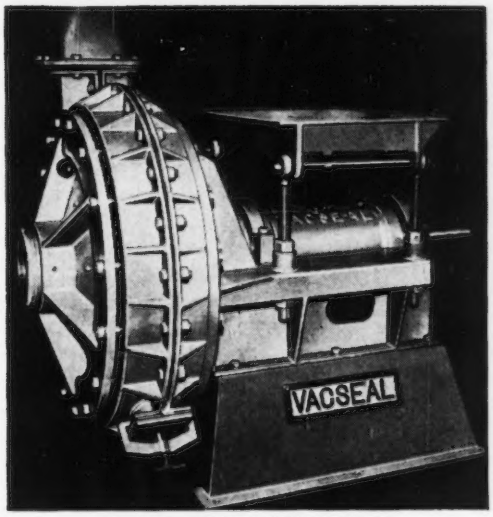


Primary Gyratory Crushers | Rotary Kilns | Secondary Gyratory Crushers | Ball Mills | Jaw Crushers | Apron Feeders

78% OF USERS HAVE ORDERED ADDITIONAL VACSEAL PUMPS



Galigher began manufacturing, selling and servicing Vacseal Pumps in the United States as recently as 1950. Since that year, many Vacseal installations, in many industries, have been made. Have users liked its performance? The emphatically affirmative answer is in the fact that 78% have purchased additional Vacseal Pumps for other installations.



(Newly designed 8-inch Vacseal Pump with replaceable rubber liners.)

VACSEAL DELIVERS!

Vacseal Pumps deliver on every count — dependable on-the-job service, rugged wear and ready adaptability to every type of pumping operation. And this unique PLUS value: Vacseal is "virtually glandless," a feature that minimizes impeller adjustments — and NO SEALING WATER is required to protect glands and clearance spaces.

WRITE FOR CATALOG that gives full details on both Vertical and Standard Vacseal Pumps.

Leaders in Experience & Service

HOME OFFICE
545 West 8th South
Salt Lake City, Utah
P. O. Box 209

EASTERN OFFICE
921 Bergen Avenue
Jersey City, New Jersey

Agents In All Principal Foreign Mining Districts

THE GALIGHER CO.

METALLURGICAL DIVISION · ENGINEERING SERVICE

CONSULTATION • ORE TESTING
PLANT DESIGN • GEOLOGIC INVESTIGATION

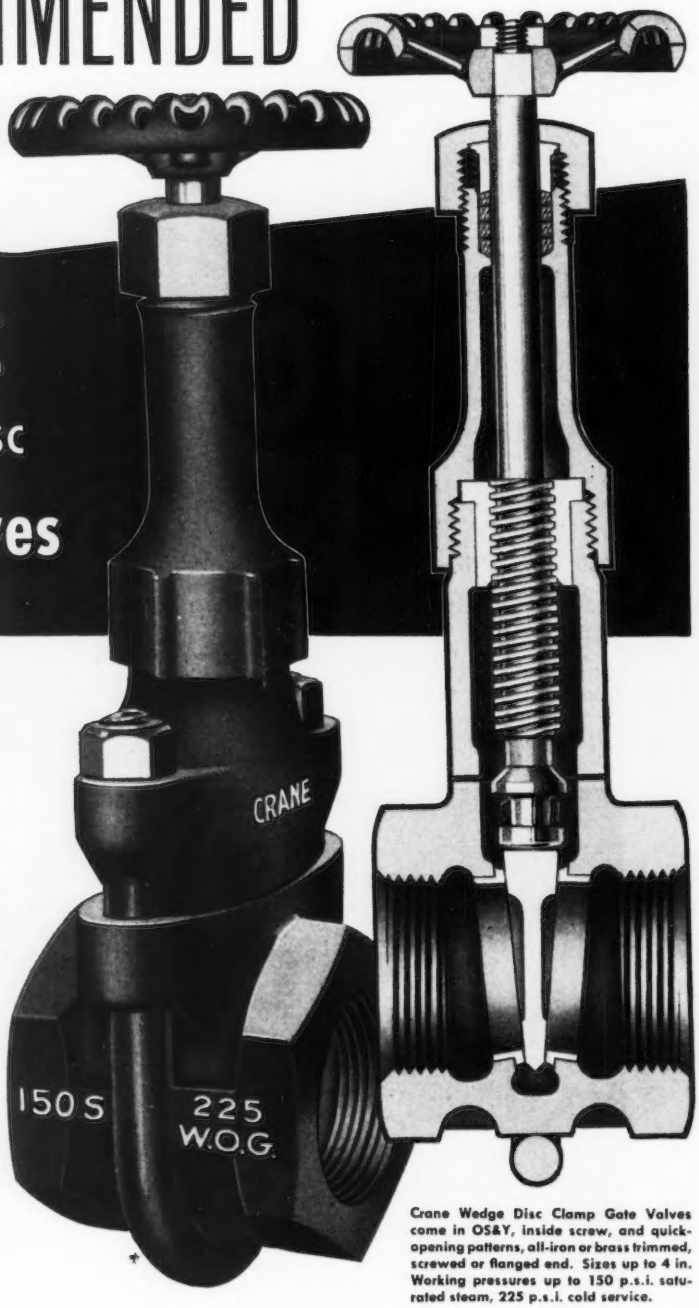
HIGHLY RECOMMENDED

for low cost service

CRANE

IRON BODY—WEDGE DISC

Clamp Gate Valves



Crane Wedge Disc Clamp Gate Valves come in OS&Y, inside screw, and quick-opening patterns, all-iron or brass trimmed, screwed or flanged end. Sizes up to 4 in. Working pressures up to 150 p.s.i. saturated steam, 225 p.s.i. cold service.

Low in first cost, as well as in upkeep . . . and look at their wide utility—

Use Crane Clamp Gate Valves for steam; hot and cold water; crude, fuel, and lubricating oil; air, gas, and gasoline service.

Also in food and chemical process industries for caustic solutions, alkalies, corrosive chemicals, and gases.

You'll find Crane Clamp Gate Valves extra rugged, with a strong reinforced body and husky stem. Their compact design means a better fit for more places . . . a saving on piping in many cases. And because of the simplified clamp construction, these valves enjoy wide favor where frequent cleanout is essential. The bonnet assembly and wedge disc lift out easily—the body stays in the line. Reassembling is no problem—the bonnet joint makes up tight and stays tight.

Wide choice of regular patterns, all-iron or brass trimmed. On inside screw all-iron valves, an improved self-draining bonnet prevents entrapment of line fluids in the bonnet—protects the threads, keeps the stem working smoothly. Send for Folder AD 1667 or ask your Crane Representative for full details.

THE BETTER QUALITY . . . BIGGER VALUE LINE . . . IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

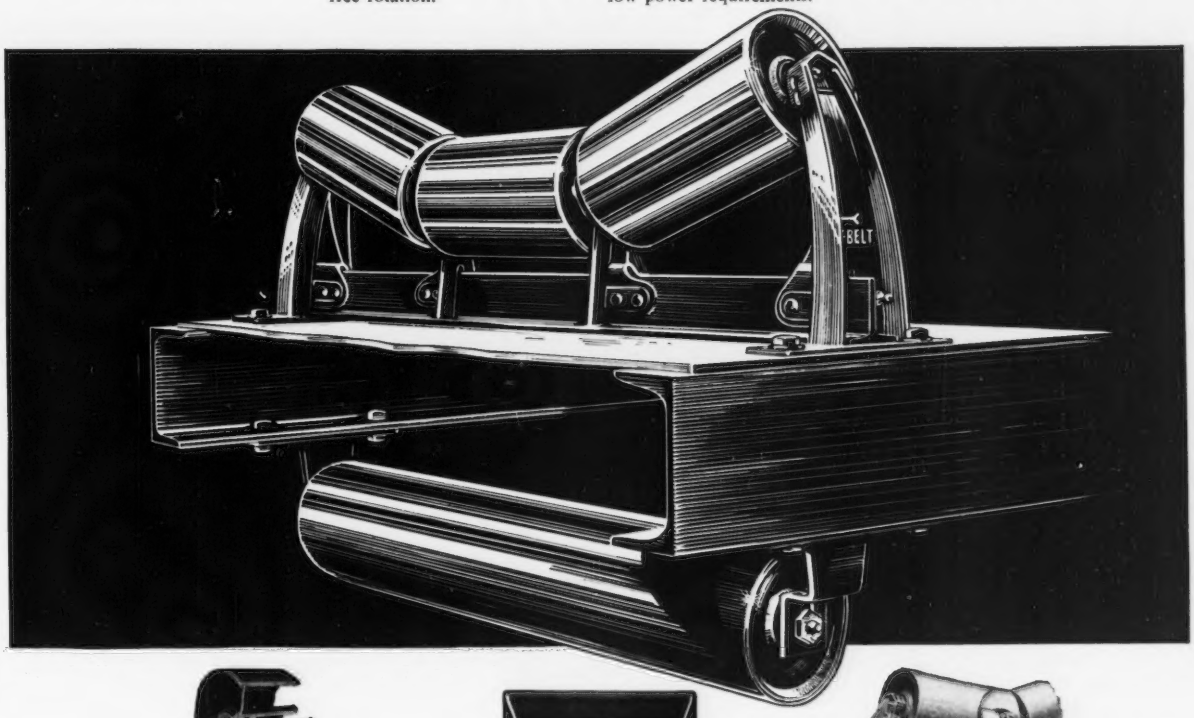
7 solid reasons why it pays to standardize on LINK-BELT IDLERS

1 STRONG, RIGID FRAMES support rolls in perfect alignment. Rolls are securely held in place but can be easily removed for inspection and service.

2 CONCENTRIC ROLLS have smooth surfaces and rounded edges. Machine-made, continuous welds prevent entrance of dirt and moisture—assure hop-free rotation.

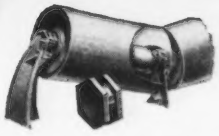
3 HUSKY, HIGHEST QUALITY BEARINGS, free and easy turning, provide concentricity and perfect alignment for smooth operation, minimum belt wear, low power requirements.

4 SAFE, CONVENIENT GREASE FITTINGS provide ease of lubrication. Extensions can be furnished for greater accessibility in out-of-the-way locations.



5 POSITIVE, COMBINATION GREASE SEAL unit retains lubricant, prolongs bearing life. The most effective seal offered in idlers today!

6 ROLLS consist of a counterbored outer shell plus a full-length, heavy central tube of 3/16-in. steel. Both tube and shell are welded to dished steel heads to maintain balance and bearing alignment.



7 HEX NUTS provide bearing adjustment at shaft ends and prevent rotation in service. Nuts prevent bracket from spreading under unusual impact.

Get the right idler from industry's most comprehensive line

Link-Belt makes more than 500 belt conveyor idlers in 34 types. You can select from light, medium or heavy-duty 20° troughing idlers, two types of 45° idlers, flat belt, belt training, rubber cushion and the new Link-Belt variable troughing idler. Most are built in a broad range of roll diameters and belt widths with matching return idlers. Ask your Link-Belt sales representative or distributor for new 48-page Book 2416.

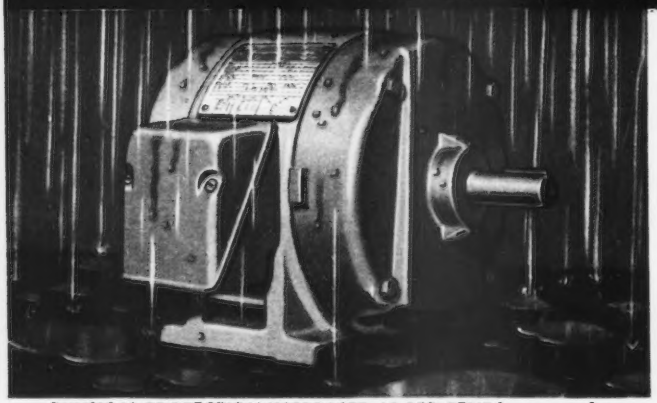
LINK-BELT

BELT CONVEYOR IDLERS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

13.415

YOU GET EVEN LONGER MOTOR LIFE



PHYSICAL PROTECTION INCREASED 60 PER-CENT by a complete redesign of cast-iron frame and end shields. This motor is suitable for many jobs where ordinary dripproof motors should not be applied.

EXTRA ELECTRICAL STRENGTH is assured by use of new polyester film insulation. A silicone coating, Dri-film,* virtually eliminates stator insulation failure caused by moisture.

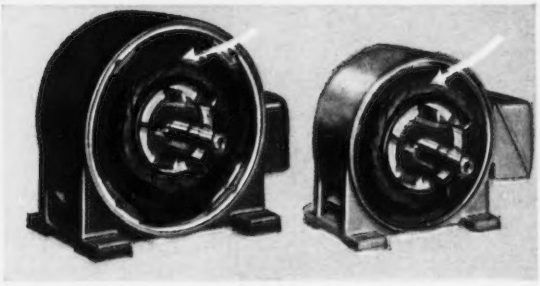
*REG. U.S. PAT. OFF.

TRI 55 CLAD THE LEADER IN MODERN MOTOR DESIGN

GENERAL ELECTRIC ANNOUNCES...

THE ALL-NEW TRI 55 CLAD MOTOR

REG U.S. PAT OFF.



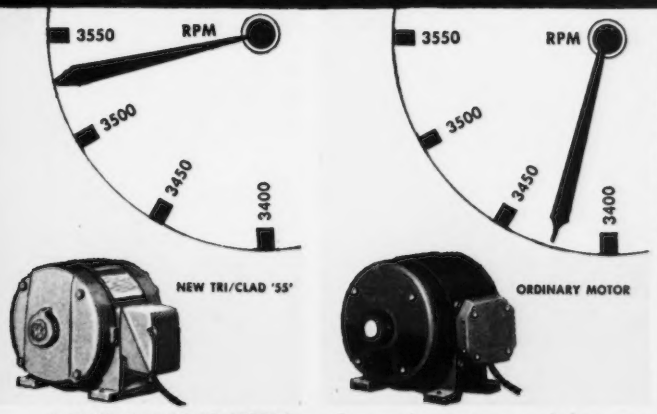
LIGHTER, SMALLER Tri/Clad '55' motors have been made possible through better use of space within the frame. Active materials (magnetic steel, copper) have not been sacrificed.

Complete Line of Dripproof, Enclosed Motors and Gear-Motors Available in Most Ratings in 1954

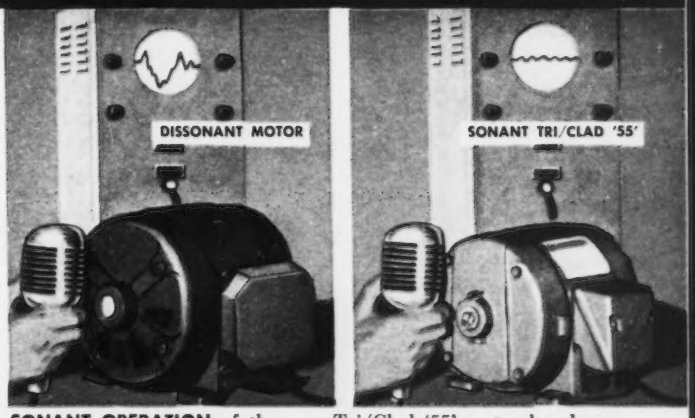
Here's the all-new Tri/Clad '55' motor — now available in NEMA 182 and 184 frame sizes.

You can get complete information on this dramatic motor achievement by writing for bulletin GEA-6013 on Tri/Clad '55' Dripproof motors, GEA-6012 on Tri/Clad '55' Enclosed motors, or GEA-6027 on Tri/Clad '55' Gear-motors, or by contacting your nearby G-E Apparatus Sales Office or G-E Motor Agent. General Electric Company, Section 648-1, Schenectady 5, N. Y.

YOU GET EVEN BETTER PERFORMANCE



HIGHER FULL-LOAD SPEEDS is only one of many improved characteristics of this new G.E. motor. Above shows comparison of an ordinary motor with the Tri/Clad '55' — both rated at 3600 rpm.



SONANT OPERATION of the new Tri/Clad '55' motor has been laboratory tested and proven. Motor operates at reduced noise level, and operating sound is pitched to a more pleasant frequency.

YOU GET EVEN MORE INSTALLATION AND MAINTENANCE SAVINGS

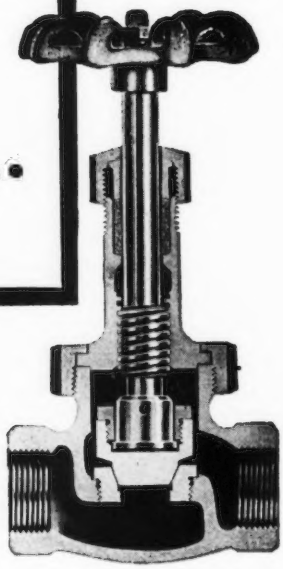
NEW BEARING SYSTEM allows this motor to run longer than other motors without regreasing. One reason—greatly improved synthesized grease with 8 times the mechanical stability of ordinary grease.

EASIER TO SERVICE, the new Tri/Clad '55' has larger conduit box diagonally split for simplified wiring. Perma-numbered leads mean that even clipped and stripped wires are instantly identified.

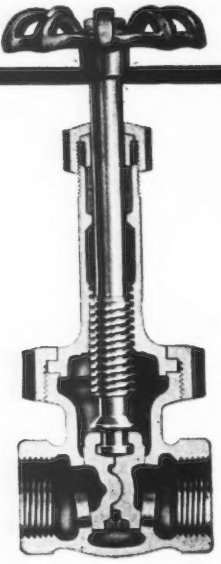
Progress is our most important product

GENERAL ELECTRIC

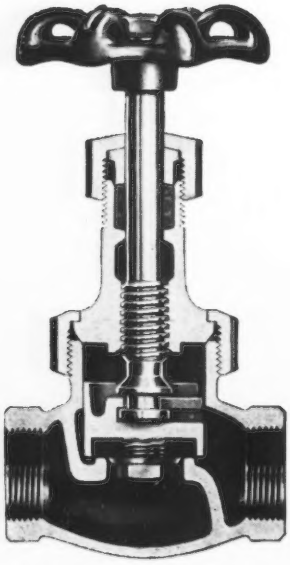
Walworth bronze valves...



Walworth No. 225P Globe Valve
500 Brinell Seat and Disc



Walworth
No. 29 Gate Valve



Walworth No. 95 Globe Valve
Re-New-Disc

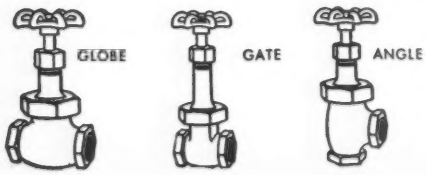
built to give dependable trouble-free service on all recommended jobs

Walworth No. 95 Bronze Globe Valves (Angle Type: No. 96) are recommended for service where throttling is not required. They are rated at 150 psi working steam pressure, 500F; 300 psi cold water, oil or gas. The improved renewable disc and lock-on, slip-off disc holder — an original Walworth development—saves time and trouble. This valve can be repacked under pressure when fully opened. All parts are designed to give maximum service and strength.

Walworth No. 29 Bronze Gate Valves are rated at 200 psi working steam pressure, 550F; 400 psi cold water, oil and gas. These valves have rising stems and integral seats. Sizes 2-inch and smaller have union bonnets; sizes 2½ and 3-inch have bolted bonnets. Valves up to and including ¾-inch have solid wedge discs; 1-inch and larger have split wedge discs. These valves can be repacked under pressure when fully opened.

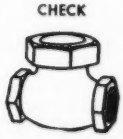
Walworth No. 225P Bronze Globe Valves (Angle Type: No. 227P) are rated at 350 psi working steam pressure, 550F; and 1000 psi non-shock service on cold water, oil and gas. The stainless steel, plug type seat and disc — heat treated to 500 Brinell — can be closed on sand, slag, scale and similar floatage, without injury to the seating surfaces. They are the longest wearing, TOUGHEST bronze valves you can buy.

For full information about Walworth Quality Bronze Valves, see your Walworth distributor, or write:



WALWORTH
valves and fittings

60 EAST 42nd STREET NEW YORK 17, N. Y.



another quality product of GARDNER-DENVER engineering . . .

NEW Mobiljumbo with remote drill controls

ONE MAN controls all operations from operator's seat:

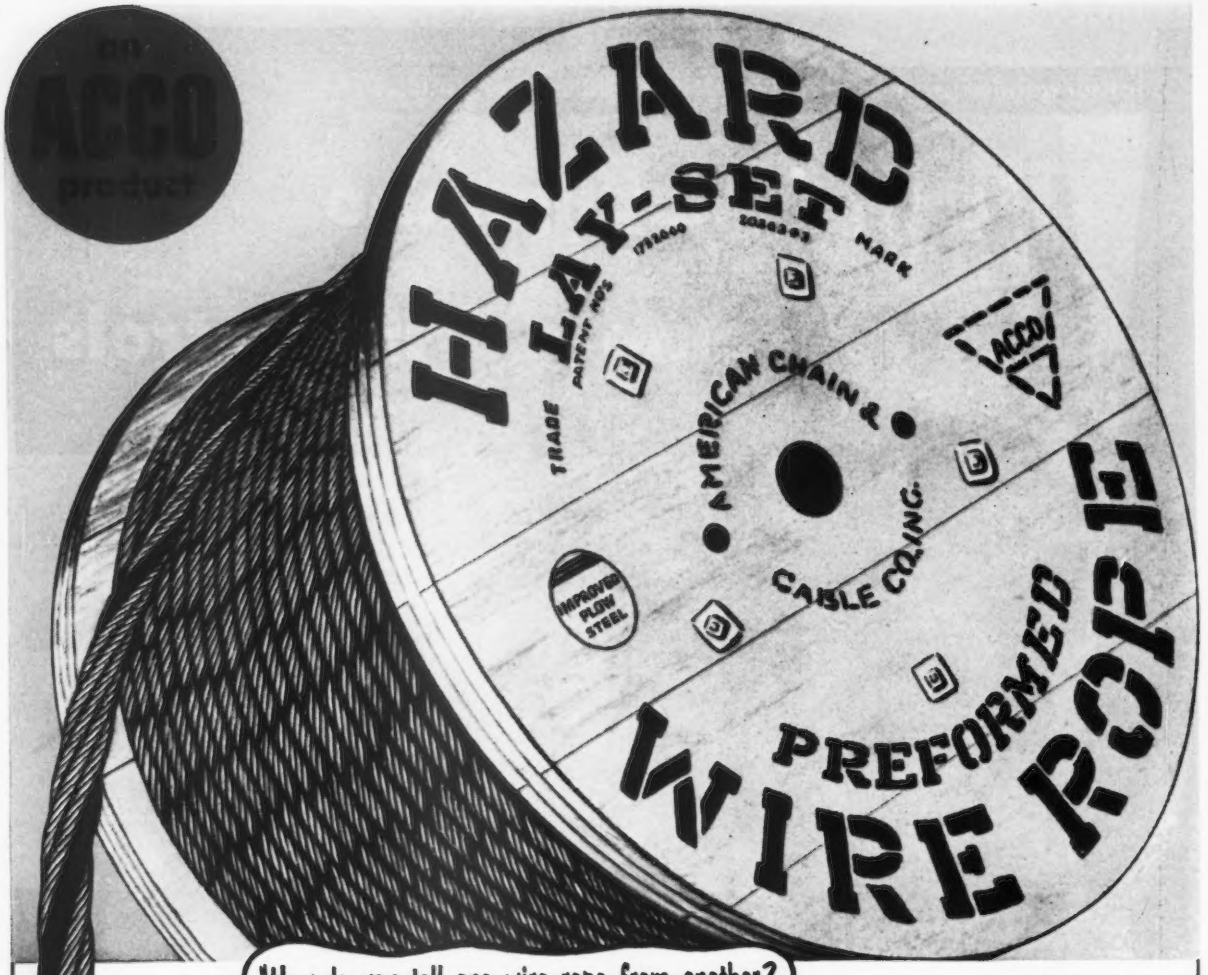
moving into position
lowering stabilizing jacks
raising or lowering booms
swinging booms right or left
swinging drills vertically
swinging drills horizontally
throttling drills
feeding drills
cleaning hole
withdrawing steel

All positioning hydraulically locked.
Save time . . . save labor . . . with the new JSP Mobiljumbo with remote hydraulic control. Write for additional details.

SINCE 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada) Ltd., 14 Curity Avenue, Toronto 13, Ontario



"How do you tell one wire rope from another? They all look the same to me."

"It's not easy, but during the 15 years I've been using wire rope I've learned this: Pick a good brand and stick to it. We decided on HAZARD Lay-Set Preformed which has a green strand for quick identification. HAZARD makes a complete line and their recommendation book tells us the constructions that will give us the best service. "HAZARD has good distributors wherever we operate and we can pick up what we need in a hurry."

Get a free copy of No. 129-B HAZARD *"Wire Rope Recommendations for General Contractors."* See your nearby HAZARD distributor or write our Wilkes-Barre, Pa., office today.

ACCO

Hazard Wire Rope Division
AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

MORE GRINDING PER PLATE... REDUCED COST PER TON...

with USS Lorain Rolled Plate Linings

MADE from top-grade *rolled steel*, Lorain Linings have far greater wearing life than regular cast linings. Their outstanding strength makes possible the use of thinner sections, saves first cost of metal . . . increases usable diameter of the mill, boosts output. The tight joints between ends of plates and close fit between plates and lift bars eliminate shell wash and allied troubles.

No matter what you grind, USS Lorain Rolled Plate Linings will produce better grinding results, more economically. They're made in easy-to-handle sections that save hours of installation time. They keep mill down-time to a minimum. They're so rugged they'll wear 'til they're paper thin without failing!

The Liner Plates of Lorain Linings are made symmetrical and interchangeable. Severe localized wear at feed or discharge end can be balanced by heat-treating. The lift bars, carefully designed to insure correct cascade action, are available in different lift heights to suit conditions. Lift height will remain approximately constant for life of the lining.

USS Lorain Rolled Plate Linings are available—in the diameter, length and thickness best suited to your operating conditions—through leading mill manufacturers whose names will be furnished upon request.

USS GRINDING BALLS are carefully made of special composition steel to take long, rough wear evenly. Samples from each production lot are thoroughly tested to make sure of surface hardness and maximum hardness penetration. They come in eleven sizes from ¾" to 5". For further information just return the coupon at the right.

United States Steel Corporation
Room 4297, 525 William Penn Place
Pittsburgh 30, Pa.

Without obligation on my part, please send me your FREE booklet on USS Grinding Balls.

Name .....

Company .....

Address .....

City ..... State .....

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS LORAIN ROLLED PLATE LININGS *and* USS GRINDING BALLS

USS

4-463

UNITED STATES STEEL

"It's got to take this switch at four miles a second..."

"That's about the speed of the detonating wave as it travels along the Primacord. The trunk line detonates each branch line which, in turn, detonates the charge.

"When I hook up *Plain* or *Reinforced* or *Wire Countered* Primacord, I use a half hitch like this. When you pull it up tight, it stays that way. And a tight, right-angle connection is absolutely necessary.

"Take your time in every step in loading and laying out your blast – and above all, be sure your Primacord connections are *tight*, because here's one place where it pays to be TIGHT!" P-13

See your explosives supplier or write for information to

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut

Also Safety Fuse since 1836

PRIMACORD® *detonating fuse*

PROVED and APPROVED

WHAT FULL CONTROL MEANS

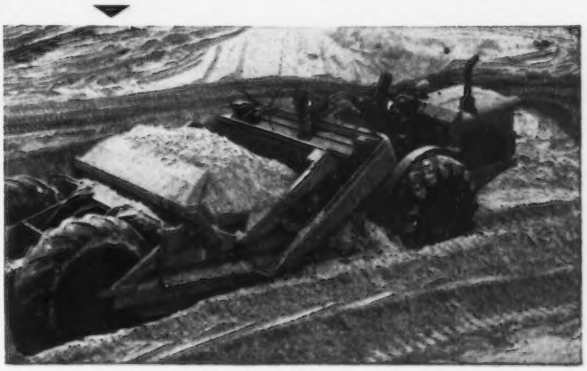
to the operator of an Allis-Chalmers TR-200 Motor Wagon

Fast, Efficient Loading — hydraulic steering control gets the TR-200 under the shovel fast without tiring wheel fight. Large top area permits fast loading with less spillage . . . double steel floor is reinforced with heavy oak plank to absorb loading shocks. Steering jacks and tires are fully protected from falling rock. The TR-200 carries 15 cu. yd. heaped or 18-ton loads.

Quick, Clean Dumping — operator controls two hydraulic jacks to dump and return bowl. Because this unit's wheelbase remains stationary, all four brakes can be set for maximum safety in bank-edge dumping. Rear end dumps far enough over embankment to eliminate rehandling material. Tapered bowl design and 70-degree tilt give quick, complete load ejection. Body may be heated to prevent load freezing.

Safe, High-Production Hauling — no worry when highballing a full load because four-wheel air brakes stop the TR-200 quickly even if the engine should stall. Steering pistons are equipped with stops to eliminate jackknifing. High horsepower-to-yardage ratio and large, rock-lug tires speed your operations . . . even on steep grades and in heavy going. The TR-200 travels at speeds up to 21.6 mph., delivers more loads, reduces idle shovel time.

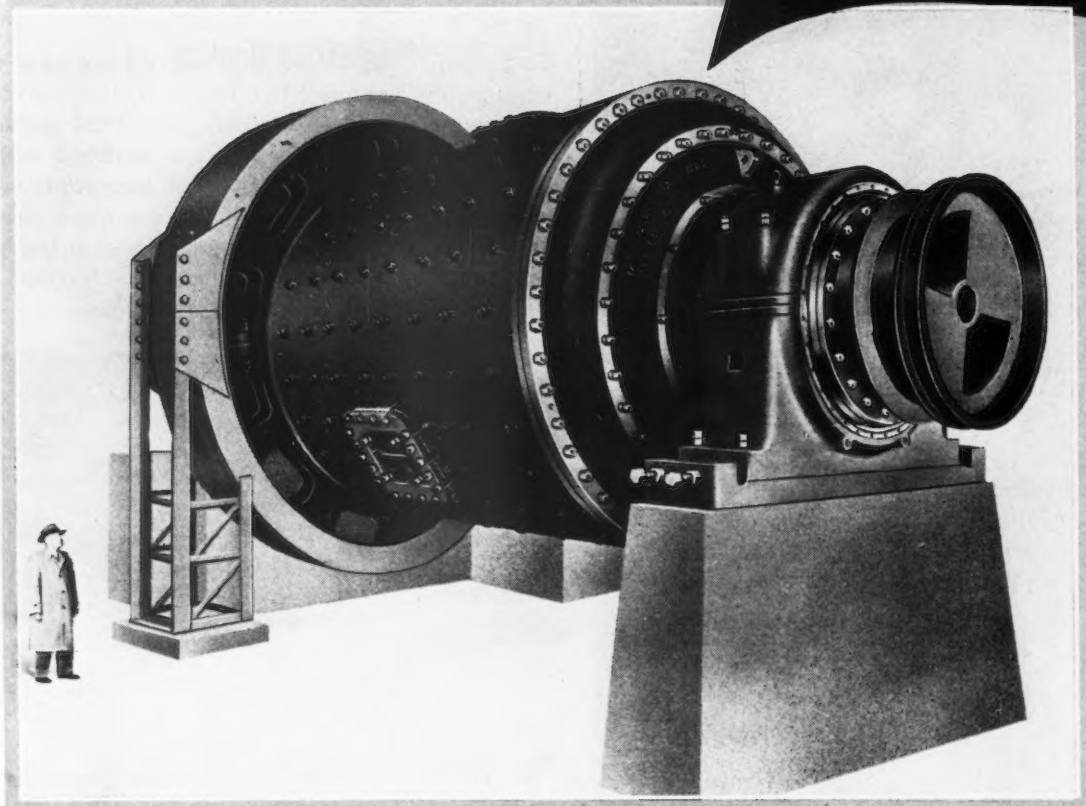
Plus Added Versatility — The same 176-hp. diesel tractor unit and hydraulic controls may be used to operate an interchangeable self-loading scraper body for large scale stripping and hauling jobs.



GET THE FULL STORY FROM YOUR ALLIS-CHALMERS DEALER

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, WIS.

largest ore-grinding mills ever built



Marcy 12'-6" I.D. x 13' Grate Discharge Ball Mills

Here's a typical example of M&S specialized grinding engineering service...designing and manufacturing new, larger mills which would give the desired tonnage with lower capital investment in equipment and buildings, compared with sizes previously available.

Each of the six 12'6" Marcys ordered by this Michigan copper company is powered by a 1500 hp motor; weighs 369,000 lbs.; has all the proved advantages of the MARCY* low-pulp-line, grate discharge principle of grinding.

*Both Marcy and Massco are registered trademarks.

The Mine & Smelter Supply Co.

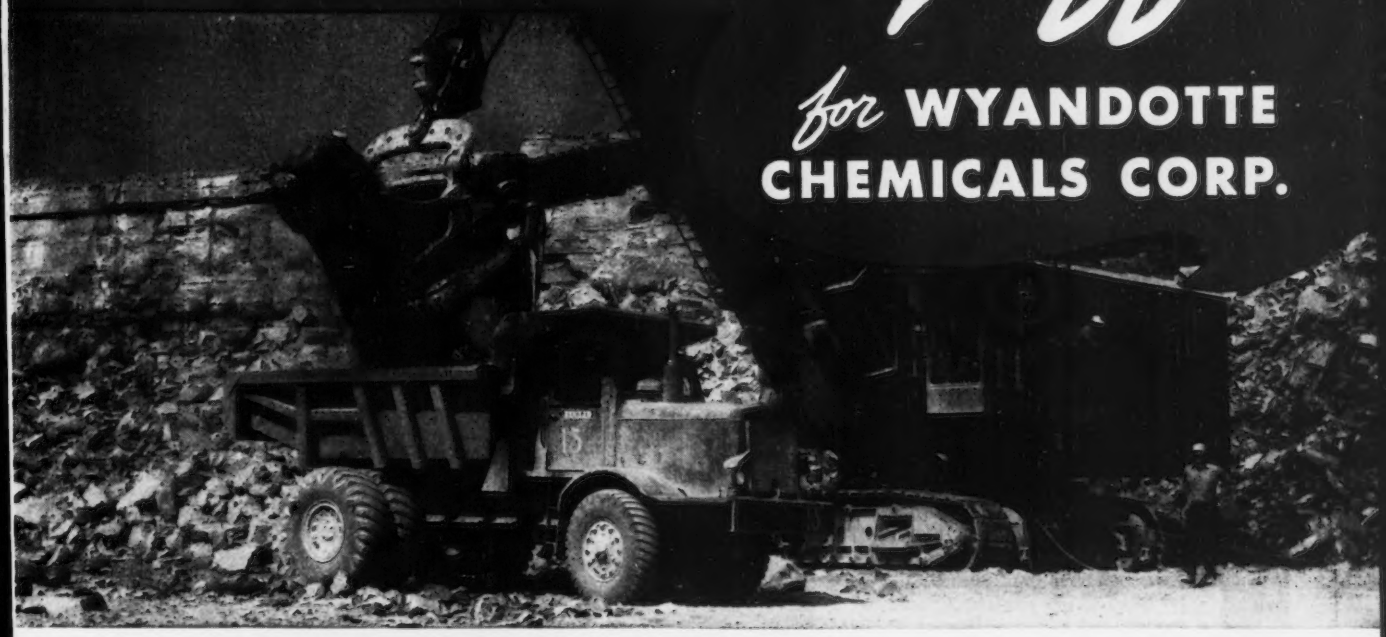
DENVER 17, COLORADO

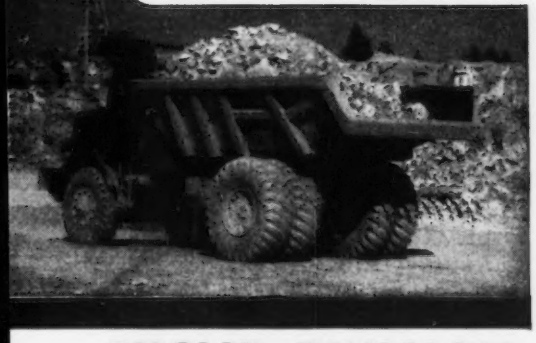
OFFICES IN SALT LAKE CITY, EL PASO, 1775 BROADWAY, N. Y. C.

REPRESENTATIVES IN FOREIGN COUNTRIES

"Eucs" Pay Off

for WYANDOTTE CHEMICALS CORP.





22,000 hours...still going strong!

At Alpena, Michigan, Wyandotte Chemicals Corp. operates one of the world's largest limestone quarries—another job where "Eucs" are paying off in more loads per hour at less operating and maintenance cost.

Seven years ago Rear-Dump Euclids of 22-ton capacity replaced an electric haulage system for moving rock from the quarry face to the plant. Loaded with stone by shovels of 5 and 6 cu. yd. capacity, and hauling overburden during the winter months, these fourteen "Eucs" have worked an average of 22,000 hours each. On a two mile round trip haul, each "Euc" delivers approximately 75 tons per hour for a total of more than 3 million ton-miles per unit.

Wyandotte standardized on Rear-Dump Euclids because of their job proved dependability on hundreds of mine and quarry operations. Performance records prove this decision has paid off because "Euc" speed, capacity and efficiency have increased production and lowered hauling costs at Alpena.

Your nearby Euclid distributor will be glad to discuss your off-the-road hauling problems and show you how and why "Eucs" can do a better job for you.

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

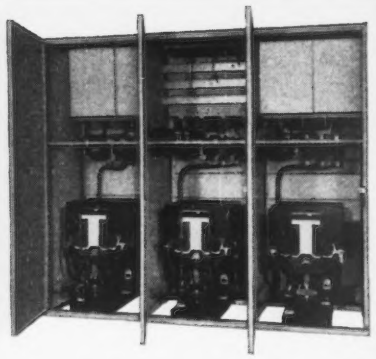
CABLE ADDRESS: YUKLID CODE: BENTLEY

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

GM GENERAL MOTORS

"Starting Line-up"



Rear view of HALC Controller Line-up. Bus covers provide maximum protection for personnel and equipment. Starters may be equipped with either oil-immersed or air-break contactors . . . installed in the same space. All components are readily accessible for maintenance.

ALLIS-CHALMERS

Type H Starters

FOR 2300 TO 5000 VOLT MOTORS

▶Easy to Install ▶Simple to Expand ▶Attractive in Appearance

The factory assembled line-up of Type H Starters affords the many advantages of centralized high voltage control for an entire department or plant. One attractive, space-saving group takes the place of many separate cabinets and components. Planning and purchasing are simplified. Installation is quick and easy — only one incoming power feeder required. Internal bus and convenient wiring provisions plus standardization of cubicle size facilitate the addition of starters.

Allis-Chalmers Type H Starters may also be used singly. Each starter is a complete control unit. Contactors, protective devices, meters, relays . . . all the coordinated components necessary for maximum protection of man, motor and machine are engineered into each starter. A-4217

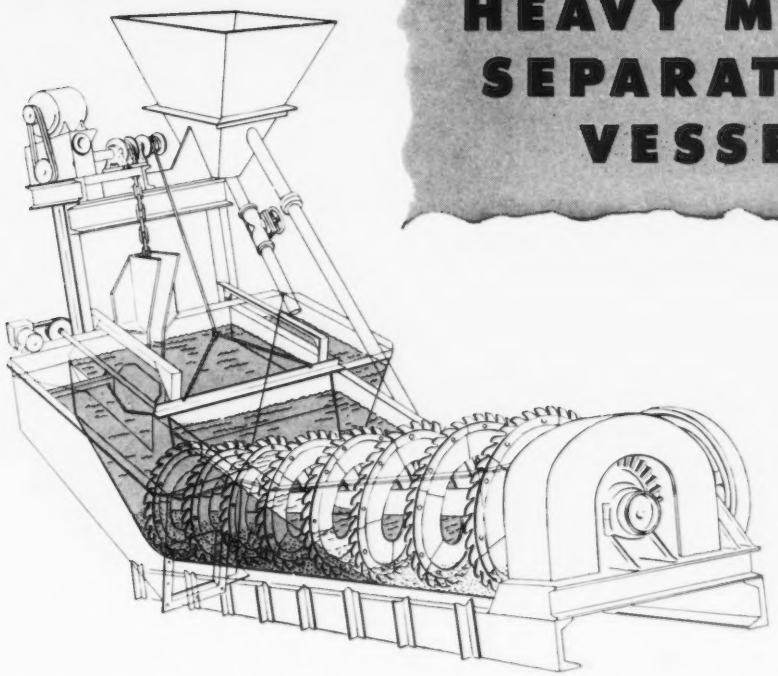
New Bulletin — Type H Starters are built in a wide range of ratings for squirrel-cage, wound-rotor and synchronous motors . . . for full or reduced voltage . . . reversing or non-reversing . . . with plugging, dynamic braking and multi-speed features. New bulletin 14B6410B tells the complete story. See your nearby A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

PROVED ADVANTAGES of

AKINS HEAVY MEDIA SEPARATORY VESSEL



Variation in Feed Rate, or Grade of Feed, is Not Detrimental

Because the Akins has a large pool area and volume, any increase or decrease in the rate of feed does not materially change the pool level. An increase in the amount of float will not crowd the machine causing float to report with the sink. Likewise, an increase in the amount of sink will not cause a crowding action causing sink to report with the float. Since the change in feed rate and in ore grade does not materially affect the pool level, circulation of media remains constant and metallurgical efficiency is maintained at a high level.

OTHER OUTSTANDING ADVANTAGES OF AKINS

Large pool area and volume facilitate better recovery of values from fine sizes.

Entire vessel is visible.

No intermixing of sink and float in product discharge.

Circulation of media at lower gravity and viscosity.

Gradation of gravity and viscosity from feed entry point to sink removal point provides natural cleansing of sink.

Three product separation in one machine.

Akins—the ORIGINAL spiral type classifier.

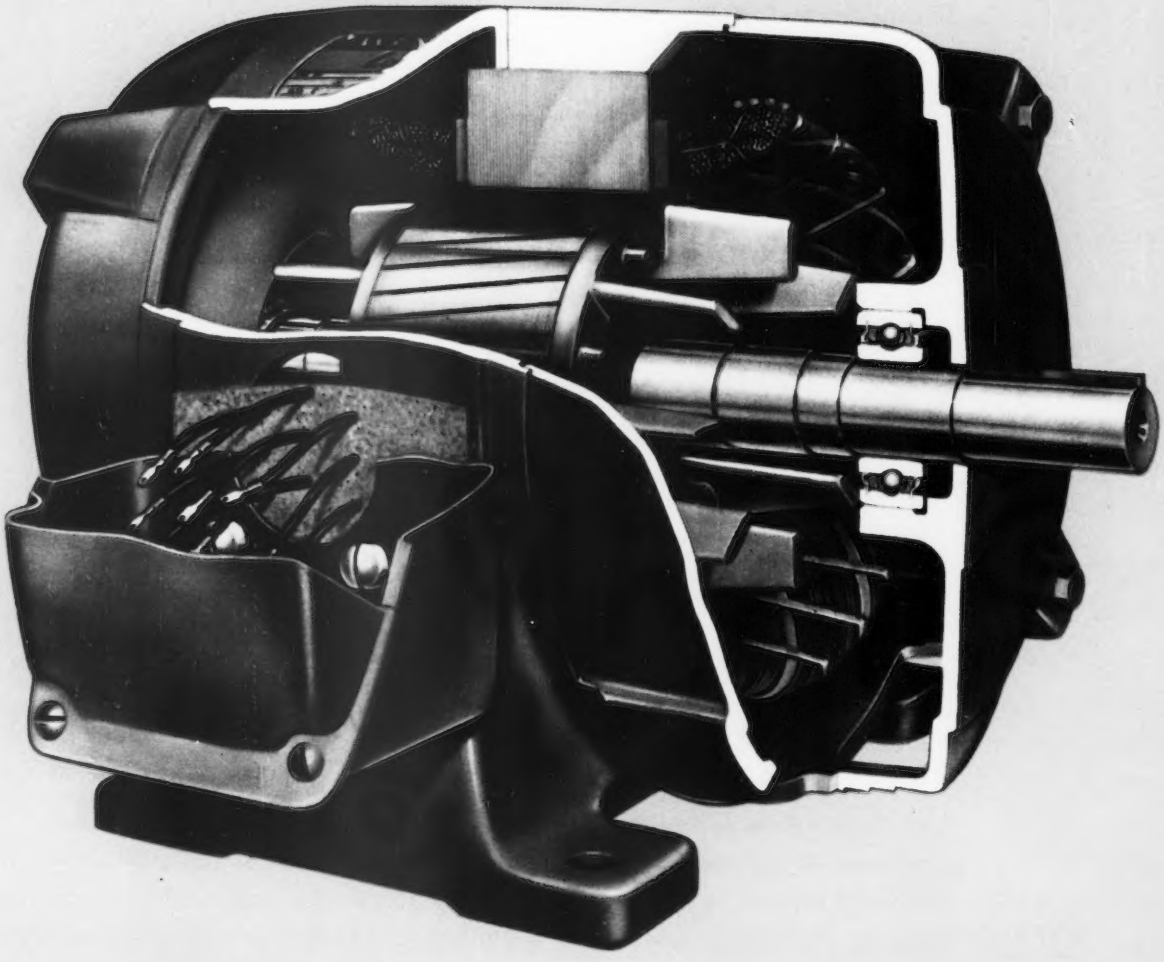
COLORADO IRON WORKS CO.

1624 17th Street • Denver 2, Colorado

AKINS CLASSIFIERS • SKINNER ROASTERS • LOWDEN DRYERS

Sales Agents and Licensed Manufacturers in Foreign Countries

A SUBSIDIARY OF THE MINE & SMELTER SUPPLY CO.



New 4-WAY SEAL, pre-lubricated bearing means lower maintenance costs. Another step ahead in bearing design. A SEALED, PRE-LUBRICATED bearing with *two* protective seals on *each side.* Stationary inner seals form labyrinth joints. Rotating outer seals act as flingers. This bearing has all the advantages of the original Life-Line sealed bearing—*plus extra protection.*

New FORTIFIED INSULATION means longer motor life. Another step ahead in motor insulation. MYLAR*, a new slot insulation with greater dielectric and mechanical strength. BONDAR, a new wire insulation with more heat resistance . . . longer life. BONDITE, a new stator insulation with greater strength to withstand attacks from destructive elements.

*Trademark for DuPont polyester film

New PROTECTED HOUSING means dripproof in any position. Another step ahead in motor protection. End-bracket openings are located in the underquadrant for maximum protection. Brackets can be rotated 90° or 180° for wall or ceiling mounting. Circumference of motor frame is *completely enclosed* so that it remains dripproof in *all* mounting positions.

The new Life-Line A motor
...the big step ahead by Westinghouse

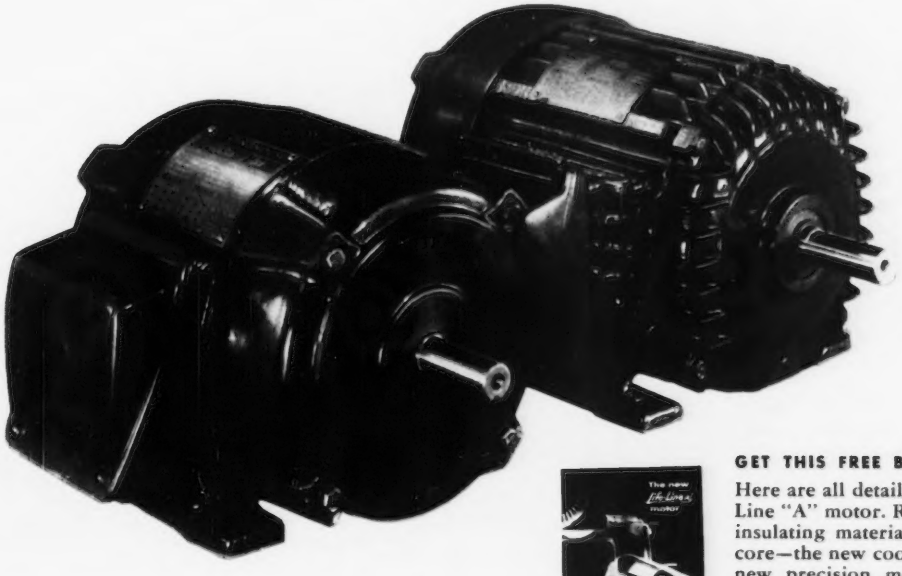
Here it is . . . the new Life-Line® "A" motor. A new motor that steps ahead to lead the industry. A new motor that reflects the continuing engineering and manufacturing leadership of Westinghouse. A new motor that gives you . . .

Greater protection
Greater application flexibility
Smoother, quieter operation
Lower maintenance costs
Fewer motor outages
Longer motor life

The new Life-Line "A" motor is still a step ahead of the industry. How? Through balanced design and proved performance. Look at the improved materials and advanced mechanical and electrical components—each one matched to its neighbor.

New? Yes, but not untried. The new Life-Line does not discard the past . . . instead it profits by it and builds upon it. Each component of the new Life-Line has been screened in the laboratory, then proved on production-line motors. You're not buying "theoretical" performance. The new Life-Line motor, is a proved Life-Line.

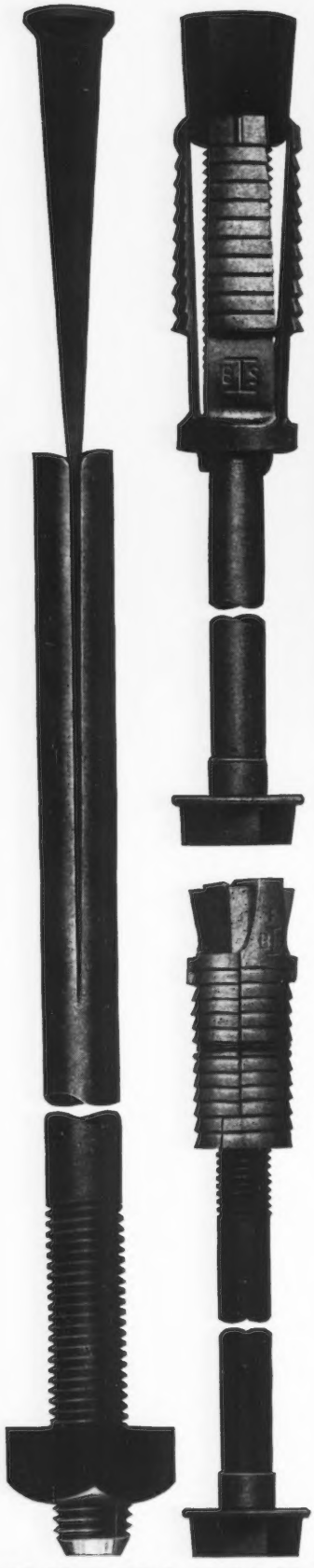
J-21846



GET THIS FREE BOOK

Here are all details on the new Life-Line "A" motor. Read about the new insulating materials—the new stator core—the new cooling methods—the new precision manufacturing techniques. Write for your free copy of Booklet B-6154. Westinghouse Electric Corporation, 3 Gateway Center, P.O. Box 868, Pittsburgh 30, Penna.

YOU CAN BE SURE...IF IT'S
Westinghouse



I Sure Like Roof Bolts!

"I've been around mines a long time, and I've seen many improvements over the years. But the one that really strikes me is these roof bolts. Now take this mine. We're using roof bolts in all new workings. It cuts down our accident rate, and gives us more room for mechanized equipment. I'm sold on 'em."

In many mines, operators are obtaining increased production and promoting greater safety for workers by using roof bolts in entries and air courses. This method of roof control eliminates the need for space-consuming timber supports, and improves ventilation.

To enable operators to obtain these desirable conditions, Bethlehem produces two types of roof bolts and shells:

SQUARE-HEAD BOLTS — 5/8-in. and 3/4-in. Diameters

The 5/8-in. square-head bolt, recently developed by Bethlehem, is a high-strength bolt, with the same physical characteristics as the 3/4-in. bolt. The bolt is furnished without ears, and is recommended for use with Bethlehem's new Type "F" shell. The shell, consisting of two pieces held in place by a wire spring, expands uniformly along its entire length. It has a maximum expansion of 1 7/8 in.

The 3/4-in. square-head bolt, furnished with an expansion shell, is for use in a 1 3/8-in. hole. It has rolled threads and an unchamfered head. Pressed ears on shank support the Type "C" shell during anchoring. When bolt is tightened, the leaves of shell expand, locking against sides of hole. Bolt can also be used with Type "F" shell.

SLOTTED BOLT — This 1-in. bolt has a centered, forged slot. No metal is removed by slotting. The other end of bolt has 5 in. of 1-in. rolled threads. When driven in 1 1/4-in. hole, the wedge is forced into slot, expanding bolt-end. Truncated-cone point prevents thread damage. Fitted with American Standard Regular Square Nut.

Bethlehem Roof Bolts come in lengths of from 2 ft to 8 ft, and can be installed vertically or at angles. For full details, write to us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM MINE ROOF BOLTS

MAXIMUM DELAY INTERVAL FLEXIBILITY WITH

DU PONT MS CONNECTORS

simplifies blasting in open-pit operations

For good fragmentation in hard-shooting Taconite . . . for reduced vibration and backbreak . . . for better control of the amount and direction of throw . . . all with maximum safety . . . use Du Pont MS (millisecond) Connectors.

Du Pont MS Connectors are available in two delay periods, MS-9 and MS-17. These can be used singly or in combination to provide the most effective interval for your job.

With Du Pont MS Connectors you can obtain any desired arrangement of delay firing between holes and rows—the hookup can be completed quickly and with minimum hazard.

Investigate the advantages offered by Du Pont MS Connectors. They're an important member of the Du Pont ore-blasting "team." For more complete information ask the Du Pont representative in your own district. You'll find him glad to be of service. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

DU PONT

BLASTING AGENTS

Products of Du Pont Research

DU PONT

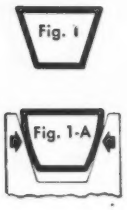
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Why V-Belts with CONCAVE SIDES Last Longer!

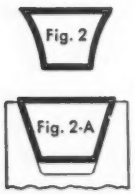
(U.S. PAT. NO. 1813698)

Prove this yourself!



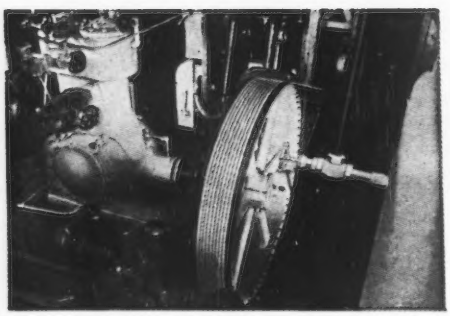
Take any *straight-sided* V-Belt (Fig. 1). Bend it—as it bends in going around a pulley. The sides will at once *bulge out* (Fig. 1-A). Clearly, those bulging sides will press *unevenly* against the V-pulley—and this causes *extra wear* at the points shown by the arrows (Fig. 1-A).

Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)



Instead of *bulging,* the precisely engineered CONCAVE SIDES merely *fill out* to *fit exactly* in the sheave groove (Fig. 2-A). The sides press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the Gates Vulco Rope—and this means *longer* belt life and *lower belt costs* for you!

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE Sides—the Gates Vulco Rope!



Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

Gates VULCO ROPE DRIVES

REG. U. S. PAT. OFF.

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

THE GATES RUBBER COMPANY

DENVER, U.S.A.

CB-541

NOW!

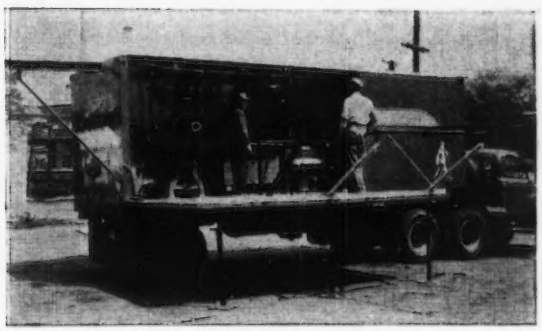
you can get big drill performance with the

CHALLENGER
Blast Hole Drill

HERE'S WHAT USERS SAY:

"Drilling cost per ton of ore broken reduced by two-thirds over wagon drills. Driller experience can further reduce to one-sixth of wagon drilling cost."

"Punched down four 60′ holes, bottoming at 4″ dia., in one shift. What a drill!"



SPECIAL DRILL AND STEEL SERVICE

The size of the Challenger Drill and the sectional steel used with it, makes necessary special drill and steel service which is provided by Joy. Service trucks, like the one shown here, make periodic visits in areas where Challenger Drills are operating. The operators of this "mobile shop" are experienced drill doctors who furnish complete drill steel service, bit sharpening service, drill inspection, and suggestions for use and application of the drill for best results.

Users' reports on early units show that you really get big drill performance with the Challenger Drill. It's a 5¼″ hammer drill (not a piston drill) that drills 4½″ diameter holes through hardest rock to depths of 50′ or more. This big drill performance calls for a 26′ feed to cut the number of steel changes, and a self-propelled mounting. Tractor-mounted on rubber tires with a portable compressor to furnish air for drilling, the Joy Challenger is the biggest cost-cutting big drill for hard rock drilling. Check your needs . . . see if this big drill won't answer your problems. ● ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

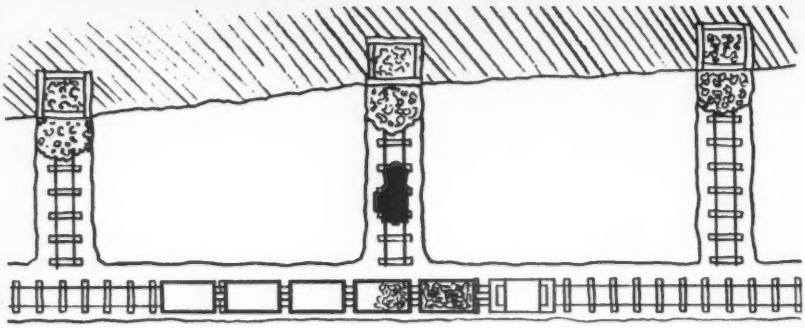
Consult a Joy Engineer

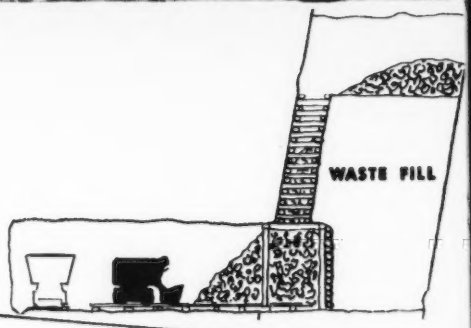
W&D C 4836

JOY

WORLD'S LARGEST BUILDER OF CORE DRILLS, ROTARY BLAST HOLE DRILLS AND MOTORIZED DRILL RIGS

INVESTIGATE THE ADVANTAGES OF LOADING WITH EIMCOS





The photo above and diagrams illustrate a highly successful, low cost operation. This is one of the Model 21 Eimcos handling production loading from drawpoints in a large iron ore mine.

This is further proof that this method of mining is safer, better and cheaper than the old method of chutes, grizzlies, scrapers, etc.

Write for more information to The Eimco Corporation, P. O. Box 300, Salt Lake City, Utah, U. S. A.

THE EIMCO 105
WORLD'S FINEST TRACTOR-EXCAVATOR

When your project requires a large producing piece of equipment as a prime mover, bulldozer, loader, excavator, let us tell you about the 105.

Loading capacity in rock about 5 yards per minute, in sand and gravel about 7½ yards per minute.

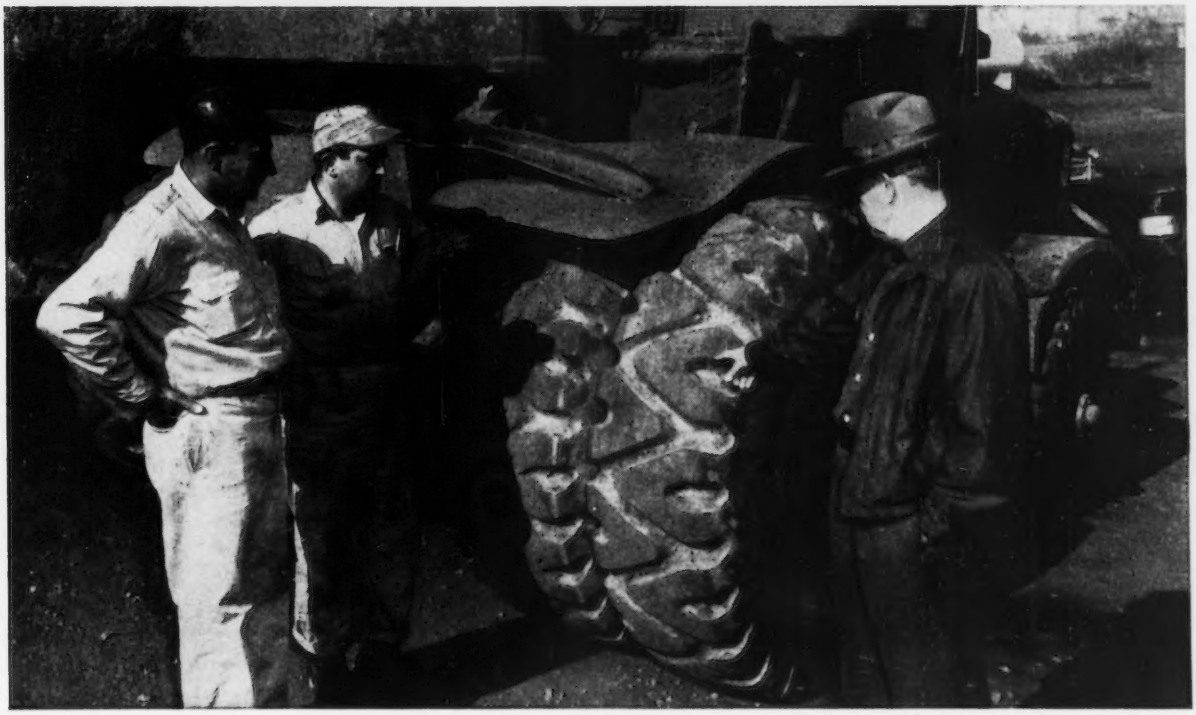
This is a really heavy-duty machine, all steel construction with greater maneuverability and longer life.

B-20

THE EIMCO CORPORATION
Salt Lake City, Utah, U.S.A.
Export Office: Eimco Bldg., 52 South St., New York City

You can't beat an Eimco!

B.F.Goodrich



Universal tires roll 125,000 miles under 40 tons of coal

THE Colonial Coal Company of Madisonville, Kentucky, hauls coal from the stripping pit to the mine tipple. Forty tons is the weight of the average load carried by the company's 20 trucks over rugged gravel and cobblestone roads. The trucks roll as many as 60 hours a week—and every one is equipped with B. F. Goodrich Universal tires.

Some of the Universal tires now in use have seen 125,000 miles of this severe service. Colonial reports Universal tires can be recapped as many as three times. One reason for such outstanding performance records is the Universal tread. It is specially compounded to resist snags and cuts. The husky, non-directional cleats resist skidding and slippage, pull through the roughest going faster and easier.

Under the tread is the patented B. F. Goodrich nylon shock shield. Layers of strong nylon cords stretch together under impact to protect the tire body from smashing road shocks. You save 4 ways because of this protection: (1) more original hours of service (2) more recappable tires and more hours of service per recap (3) increased bruise resistance (4) less danger of tread separation.

Join the growing list of mine operators who report longer service at lower cost with Universal tires. See your B. F. Goodrich retailer today. The address is listed under Tires in the Yellow Pages of your phone book. Or write *The B. F. Goodrich Company, Tire and Equipment Division, Akron 18, Ohio.*

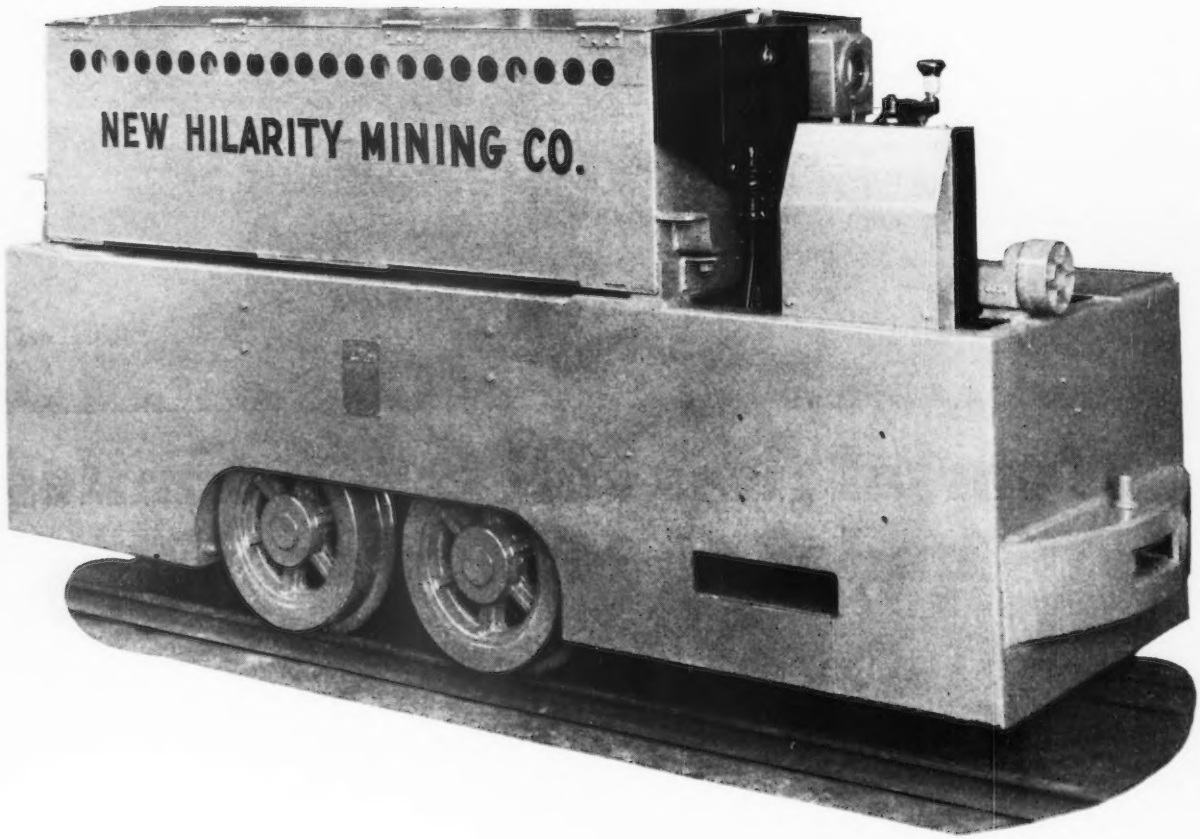
"UNIVERSAL TIRES are better than any other make of tire I know," says Everett Offit (above), driver for Colonial Coal Co. This company averages over 5,400 hours of service from BFG tires.

SHASTA COAL CORP., Bicknell, Ind., is another user of B. F. Goodrich tires. "We like the Universal tread over other treads," the company reports. "It holds the road better." (Center Rib Universal is shown at right.)

Specify B. F. Goodrich tires when ordering new equipment

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

ATLAS
Heavy Duty
TRAMMER



ATLAS 3-TON TYPE K
STORAGE BATTERY LOCOMOTIVE

SOLD IN CANADA by Mine Equipment Co., Ltd., Kirkland Lake, Ontario; International Agencies & Machinery Co., Ltd., Vancouver, B. C. SOLD IN SOUTH AFRICA by Universal Mechanisation Co. (Pty.), Ltd., Johannesburg, South Africa. Request Bulletin 1266.

THE ATLAS CAR AND MANUFACTURING CO.

ENGINEERS AND MANUFACTURERS SINCE 1896

1140 IVANHOE ROAD **CLEVELAND 10, OHIO**

When they say,
"it's the

MOST USED

MOST ABUSED

MOST USEFUL

PIECE OF EQUIPMENT WE HAVE"

Central Construction Co., Indianola, Iowa is talking about its 4-wheel-drive "PAYLOADER" tractor-shovel.

Thousands of others like them too — and so will you. See your nearby "PAYLOADER" Distributor, or write The Frank G. Hough Co., 726 Sunnyside Ave., Libertyville, Ill.

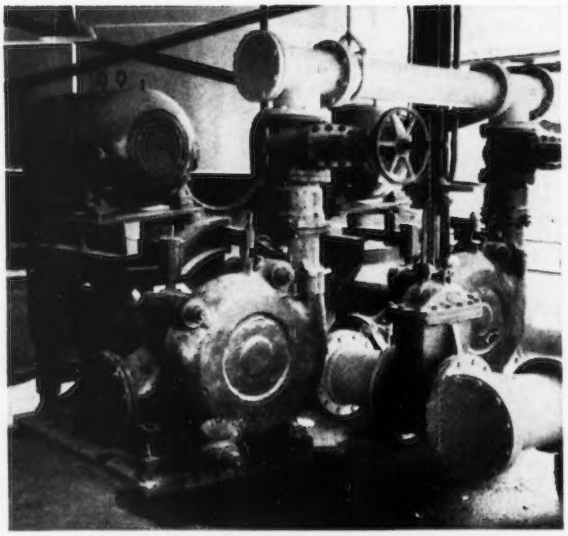
YOU CAN'T COMPETE IF YOUR EQUIPMENT IS OBSOLETE

PAYLOADER®

WILFLEY PUMPS

from Primary Slurry to Tailings

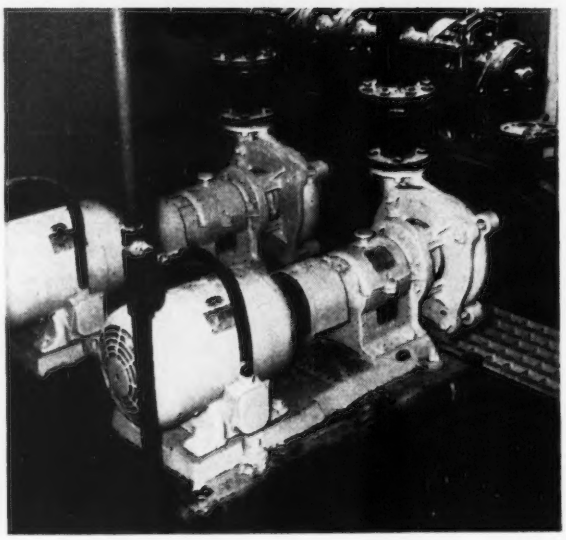
In this new southern phosphate plant, dependable WILFLEY pumps handle difficult pumping jobs efficiently and economically. Materials handled include acid, hot acid sludge and phosphate tailings. Wherever installed, these famous pumps—both Acid and Sand—consistently increase production and create substantial dollar savings in power and maintenance.



Wilfley Acid Pump

"COMPANIONS IN ECONOMICAL OPERATION"

Wilfley Sand Pump



- Cost-saving efficiency
- Stepped-up production
- Continuous operation without attention
- Minimum replacement of parts
- Designed for simple installation
- Economical pump size for every requirement

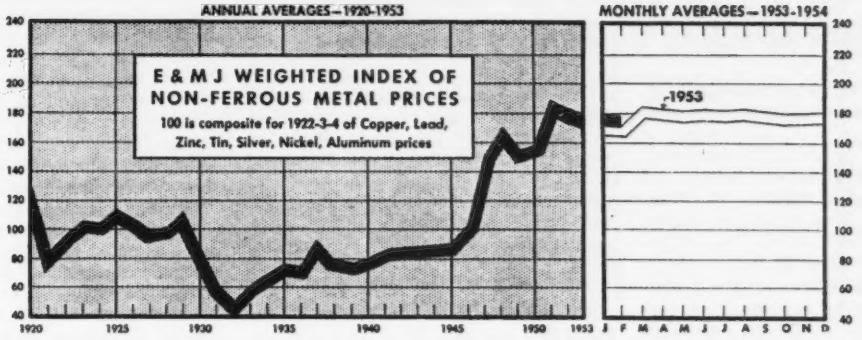
Individual engineering on every application. Write, wire, or phone for complete details.

A. R. WILFLEY & SONS, INC.

DENVER, COLORADO, U.S.A. • NEW YORK OFFICE: 1775 BROADWAY, NEW YORK CITY

E&MJ OUTLOOK

PRICES



MARKETS

Pressure of larger stocks in the hands of producers, and continuation of the trend by consumers to cut inventories, pushed lead and zinc prices to new lows for the movement. But copper's standing firm, and tin actually edged higher. Net result was a softening of the *E&MJ* non-ferrous metals price index to 178.17 for February, aganst 179.75 for January.

Signs of better business in major non-ferrous metals toward the month's end gave rise to cautious optimism over the March and second quarter outlook.

•

AT HOME

Business in general, while still likely to remain in a decline for some months, may take an upturn sooner than anyone expected. Business inventories are running out faster than expected, production has been curtailed about 10% from last year at this time (hence less chance for surpluses), and finally, Eisenhower says he'll step in to check a decline if spring brings no strength to business.

Curtailment in copper will bring U.S. output down to about 75,000 tons monthly, a drop of about 15% below 1953's average. Consumption is running about 90,000 tons monthly of new refined copper. Such cutbacks in production may well stave off a serious price decline.

Zinc output should fall by more than 12,000 tons monthly as new cut-backs are announced. There's no sign yet of real buying interest.

High grade silver ore is rumored found in substantial amounts in the Vulcan Silver-Lead mine in Idaho, leased jointly by AS&R and Day Mines from Callahan Zinc-Lead. They've reported 40-oz silver-lead ore, but informed sources say the grade of much of the ore is a lot higher.

Everybody, but everybody, is out around Moab, Utah, looking for uranium. The U.S. can use all it can get, and it looks as if the Colorado Plateau will be in a position to supply it.

•

ABROAD

Action at last seems in the cards sometime this month for the plan, signed recently by President Ibanez, to put Chile's copper industry on a more realistic basis.

Four companies are reported "interested" in titanium deposits found on the island of Molokai. Mining is all Hawaii's lacked up to now.

Uranium, lead, zinc, copper, iron ore, Canada has them all and in boom proportions. Latest is Geco's copper-zinc find north of Lake Superior and a full-scale uranium rush near Oka, Quebec.

MARKETS—Trends and Prices

Slight Upturn in New Orders for Nonferrous Metals—Lead and Zinc Quotations Lowered

PRODUCERS OF MAJOR NONFERROUS METALS booked a little more business during February than in the first month of the year. However, the gains were modest and few in the industry thought the improvement marked the end of the "corrective period." Steel operations during February averaged less than 75% of capacity. Further cutbacks were ordered in the defense program, reducing consumption of copper in both wire and brass. Excepting nickel and selenium, supplies of most metals are ample.

Though steel companies have been buying ores sparingly for several months, Cleveland-Cliffs Iron Co. announced that it has disposed of good tonnages of iron ore for delivery in the 1954 shipping season. The company's prices for the coming season, per gross ton, are the same as those in effect at the end of the 1953 season for standard grades of Lake Superior ore delivered at Lower Lake ports. Mesabi Range non-bessemer, 51.50% natural iron, is being sold on the basis of $9.90 per gross ton, with Old Range non-bessemer at $10.15.

Price Index Off

Lower lead and zinc quotations caused the *E&MJ* index of nonferrous metal prices to decline from 179.75 in January to 178.17 in February. The decline would have been greater except for unexpected strength in tin and another month of steady prices for copper. The primary aluminum situation has eased all along the line, without, however, bringing any change in the price structure. From present indications substantial tonnages of aluminum will move into the Government's stockpile during 1954.

Chile's revision of its copper program got nowhere during the last month, but there was hope for a settlement in March. The measure—covering the sale of surplus copper to the U.S., a more realistic marketing arrangement, a revised tax base, and a higher exchange rate—has been approved by President Ibanez. The Chilean Congress reconvenes early in March and the entire subject is expected to receive immediate attention. Because of numerous past delays, copper authorities here were not too optimistic over the chances for quick ratification of the deal. The delay no doubt has been a factor in supporting the world price of copper over the last six months.

Tin producers have been fairly optimistic over prospects for an international agreement, even should the U.S. not take an active part in the plan. There has been no selling pressure in tin, though production continues in excess of current requirements. The dearth of offerings has proved most embarrassing to dealers and speculators.

The proposed International Tin Agreement was the subject of a meeting called in Washington on Feb. 25 to obtain the views of U.S. consumers and importers. It was strongly hinted that the State Department is in favor of ratifying the agreement. Consumers, fearing price manipulation, are opposed to the plan.

Copper Unchanged

Despite widespread bearishness in copper, prices covering the nearby position have been remarkably steady. U.S. producers held fast to the 30c basis throughout February, with custom smelters sellers of moderate tonnages almost daily at 29½c, delivered. Consumption of copper has declined in this country but gained elsewhere. Offerings of foreign copper in this market from sources other than Chile have moderated appreciably. In fact, the prompt position in Europe has virtually moved up to the U.S. basis. European consumers, as for some months past, have found it difficult to obtain specifiable shapes of electrolytic copper without paying a premium over the asking price named daily on the London Metal Exchange. The premium has varied between £4 and £7 per long ton.

As February ended, cash copper on the London Metal Exchange, first session, was quoted at £233 per long ton bid and £234 asked. This compares with £221½ bid and £222½ asked at the beginning of the month.

U.S. mine output of copper is expected to fall because of the trend toward limiting operations to the normal work week. Additional curtailment was announced by Kennecott at its Utah, Arizona and New Mexico operations. These divisions, beginning in March, will adopt a 5-day week.

Fabricators in the U.S. shipped products to their customers during January that contained 100,805 tons of copper. This compares with 83,652 tons shipped during December. Inventory adjustments no doubt caused the wide fluctuations in the movement of the metal at the turn of the year. U.S. deliveries to fabricators in January totaled 77,091 tons, against 112,244 tons in December.

Lead at 12½c, N.Y.

Continued unsettlement in the foreign division of the lead market, coupled with cautious buying, caused the price to fall to 12½c, N.Y., on Feb. 18, a drop of one-half cent and a new low for the movement. Foreign lead sold here during the month at a shade under 12c, duty paid, ex dock, N.Y. Foreign lead was available at 10¼c, f.a.s. Gulf ports. The London quotations hardly changed throughout the month, prompt holding around £82 per long ton.

Zinc suffered because of mounting stocks. Curtailment in smelter output has spread throughout the industry and from present indications this should lower output by approximately 12,000 tons a month by the end of the first quarter. U.S. stocks of slab zinc as January ended totaled 198,792 tons, up 17,949 tons from December. Since the middle of 1953, stocks have more than doubled.

Effective Feb. 1, producers of cadmium lowered their prices on commercial stocks 30c per pound to $1.70, delivered. Consumption has moderated and stocks have increased appreciably.

Uncertainty over the U.S. Government's purchasing program for 1954 caused quicksilver to steady.

Average Prices for February (E&MJ Quotations)

Copper:	
Electrolytic, domestic, refinery	29.669
Electrolytic, export, refinery	29.000
Lead:	
Common, New York	12.818
Common, St. Louis	12.618
Silver and Sterling Exchange:	
Silver, New York, per oz.	85.250
Silver, London, pence per oz.	73.750
Sterling Exchange, "Checks"	281.292
Zinc:	
Prime Western East St. Louis	9.375
Prime Western, delivered (g)	9.875
Tin:	
New York Straits	85.034
New York, 99% min. (e)	84.034
Gold, per oz. U. S. price	$35.000
Quicksilver, per flask	$188.000
Antimony (E&MJ) (d)	31.970
Antimony, bulk, Laredo	28.500
Antimony, in cases, Laredo	29.000
Platinum, refined, per oz.	$90.000
Cadmium (a)	170.000
Cadmium (b)	172.500
Cadmium (c)	175.000
Aluminum, 99% plus, ingot	21.500
Magnesium, ingot	27.000
Nickel (f)	60.000

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange checks, in cents. Quicksilver, per flask of 76 lbs.

(a) Cadmium average based on the producers' quotations.

(b) Cadmium average based on the average of the producers' and platers' quotation.

(c) Cadmium average based on platers' quotation.

(d) Domestic, 5 tons or more but less than carload lot, packed in cases, f.o.b. New York.

(e) Tin content.

(f) F.o.b. Port Colborne, U.S. duty included.

(g) Delivered where freight exceeds 0.5c.

Markets Continued on Page 102

Manganese ore suffered along with other commodities consumed in the steel industry.

Tungsten ore continued to drop, with foreign offerings down to $16 per short ton unit of WO_3, duty extra.

Chrome ore was unsettled as buyers withdrew from the market and offerings from Turkey and other important producing centers increased. Turkish lumpy ore was available for shipment at around $51 per ton, landed here.

Imports of chrome ore in the 11 months ended November totaled 2,045,002 short tons. Domestic production in the same period amounted to 46,358 tons. U.S. consumption was estimated at 1,252,215 tons.

"Free" Gold Market

Trading in "free" gold was on a reduced scale during the last month and prices were unsettled. The volume declined by about 20% compared with January. Though European markets were weak, Bombay moved up to $48, the highest in two years. Pick's World Currency Report quotes as follows, per fine oz:

	COINS		BARS (12.5 kg.)	
	Jan. 30	Feb. 26	Jan. 30	Feb. 26
NEW YORK, transit	.....	.....	$35.20	$35.15
MANILA	$41.00	$41.25	35.05	36.75
HONG KONG	41.50	41.25	37.70	37.25
BOMBAY	46.85	49.00	45.90	48.00
TANGIER	40.00	39.75	35.15	37.10
BEYROUTH	41.00	41.25	35.30	35.25
PARIS	42.85	42.40	35.95	35.70
BUENOS AIRES	44.00	41.75	36.25	39.00

Note: All prices are computed at the free or black market value of the U. S. dollar in the local markets

Major Metals

U. S. DAILY AND AVERAGE PRICES

Feb. 1954	Electrolytic Copper (a) Domestic	(b) Export	Straits Tin New York	Lead New York	Lead St. Louis	Zinc Delivered (f)	Zinc East St. Louis
1	29.650	29.350	85.000	13.000	12.800	10.000	9.500
2	29.700	28.875	85.000	13.000	12.800	10.000	9.500
3	29.650	29.375	85.000	13.000	12.800	10.000	9.500
4	29.700	28.925	85.000	13.000	12.800	10.000	9.500
5	29.650	29.100	85.250	13.000	12.800	10.000	9.500
6	No Market	28.675	85.250	13.000	12.800	10.000	9.500
8	29.650	29.250	85.250	13.000	12.800	10.000	9.500
9	29.675	29.175	85.000	13.000	12.800	10.000	9.500
10	29.700	29.350	85.000	13.000	12.800	10.000	9.500
11	29.600	29.000	84.750	13.000	12.800	10.000	9.500
12	Holiday	29.050	Holiday	Holiday	Holiday	Holiday	Holiday
13	No Market	28.925	84.750	13.000	12.800	10.000	9.500
15	29.650	29.000	85.000	13.000	12.800	9.750	9.250
16	29.675	29.075	85.250	13.000	12.800	9.750	9.250
17	29.700	29.150	85.250	13.000	12.800	9.750	9.250
18	29.650	28.875	85.000	12.500	12.300	9.750	9.250
19	29.675	28.875	84.750	12.500	12.300	9.750	9.250
20	No Market	28.975	84.750	12.500	12.300	9.750	9.250
22	Holiday	28.800	Holiday	Holiday	Holiday	Holiday	Holiday
23	29.675	28.825	85.000	12.500	12.300	9.750	9.250
24	29.675	28.700	85.000	12.500	12.300	9.750	9.250
25	29.675	28.900	85.000	12.500	12.300	9.750	9.250
26	29.700	28.975	85.250	12.500	12.300	9.750	9.250
27	No Market	28.800	85.250	12.500	12.300	9.750	9.250
AVERAGES FOR MONTH							
Feb.	29.669	29.000	85.034	12.818	12.618	9.875	9.375
AVERAGES FOR WEEK							
Feb.							
3	29.675	28.900	85.000	13.000	12.800	10.000	9.500
10	29.675	29.079	85.125	13.000	12.800	10.000	9.500
17	29.656	29.033	85.000	13.000	12.800	9.850	9.350
24	29.669	28.842	84.900	12.500	12.300	9.750	9.250
CALENDAR WEEK AVERAGES							
Feb.							
6	29.670	29.050	85.083	13.000	12.800	10.000	9.500
13	29.656	29.125	84.950	13.000	12.800	10.000	9.500
20	29.670	28.992	85.000	12.750	12.550	9.750	9.250
27	29.681	28.833	85.100	12.500	12.300	9.750	9.250

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

Feb. 1954	Sterling Exchange "Checks"	Silver (c) New York	Silver (c) London	Gold London	Gold (d) United States
1	281.1875	85.250	73.750d.	248s.	$35.00
2	281.1875	85.250	73.750d.	248s.	35.00
3	281.1875	85.250	73.750d.	248s.	35.00
4	281.1875	85.250	73.750d.	248s.	35.00
5	281.1875	85.250	73.750d.	248s.	35.00
6	(e)	(e)	(e)	(e)	35.00
8	281.1875	85.250	73.750d.	248s.	35.00
9	281.1875	85.250	73.750d.	248s.	35.00
10	281.1875	85.250	73.750d.	248s.	35.00
11	281.4375	85.250	73.750d.	248s.	35.00
12	Holiday	Holiday	73.750d.	248s.	Holiday
13	(e)	(e)	(e)	(e)	35.00
15	281.3750	85.250	73.750d.	248s.	35.00
16	281.4375	85.250	73.750d.	248s.	35.00
17	281.3750	85.250	73.750d.	248s.	35.00
18	281.3125	85.250	73.750d.	248s.	35.00
19	281.3125	85.250	73.750d.	248s.	35.00
20	(e)	(e)	(e)	(e)	35.00
22	Holiday	Holiday	73.750d.	248s.	Holiday
23	281.3750	85.250	73.750d.	248s.	35.00
24	281.3750	85.250	73.750d.	248s.	35.00
25	281.3750	85.250	73.750d.	248s.	35.00
26	281.3750	85.250	73.750d.	248s.	35.00
27	(e)	(e)	(e)	(e)	35.00
AVERAGES FOR MONTH					
Feb.	281.292	85.250	73.750d.	—	35.00
AVERAGES FOR WEEK					
Feb.					
3	281.188	85.250	—	—	—
10	281.188	85.250	—	—	—
17	281.406	85.250	—	—	—
24	281.344	85.250	—	—	—

Calendar Week Averages, New York Silver: Feb., 6th, 85.250; 13th, 85.250; 20th, 85.250; 27th, 85.250

(e) No market (Saturday).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300¢ per pound, the average differential for delivery charges.

(b) Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075¢ for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingotbars; cathodes are sold at a discount of 0.125¢ to 0.15¢ per pound. Quotations for zinc are based on Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered, in the East, Middle West, and West, effective Jan. 1, 1951, commanded a premium of 1.35¢ per pound over the current market for Prime Western; Special High Grade 1.50¢.

(f) Prime Western delivered where freight from E. St. Louis exceeds one-half cent.

Quotations for lead are based on domestic common lead. Corroding lead commands a premium of 10 points.

(c) The Daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and fractions of a cent per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, as reported daily by regular suppliers, and is usually one quarter-cent below the price paid for such bar silver, this deduction being the allowance to such suppliers for carrying, delivering and marketing. In addition to foreign silver, the quotations also apply to domestic silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5¢ per troy ounce 1000 fine, effective July 1, 1946. London silver is pence per troy ounce, basis .999 fine.

(d) U.S. Treasury's gold price. Actual payment by the United States Treasury for gold is at .99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

Behind the By-Lines . . .

G. P. Lutjen

At Madison Square Garden it would sound something like this: "In this corner, wearing the purple trunks, from Cincinnati, Ohio, Charlie Taft. And in ths corner, wearing the lead trunks, from New York, N. Y., Drew Fletcher. Awright, you boys know the rules. Break clean in the clinches, no dirty words, and when the bell rings, come out fighting!"

On page 78 the boys come out fighting on the problem of foreign trade and U.S. mineral policy. We have a hunch we know which corner most of the crowd is sitting in, but here's a chance to check out both sides of the argument. As for us, we're going across the street for a chocolate soda. Can't stand the sight of blood.

A tankful of aluminum won't get you anywhere in your new Cadillac these days, but if you're flitting about in a rocket ship 10 years from now, as the Jr. Rocket Ranger set confidentially predicts, aluminum could well be the fuel. Even now it's being used as a fuel for special jobs and Messrs. Babcock and Rethwisch have done an excellent job on page 84, in making the facts of the case extremely readable. This should be of particular interest to those who have followed the magnesium-as-a-fuel controversy in the Letters to the Editor column.

Man, you know what else those crazy aluminum people are doing? We just heard that Reynolds Metals is conducting research in conjunction with the University of Michigan on the atomic sterilization of beer. What has this got to do with aluminum? David P. Reynolds, vp in charge of sales, put it this way: "We are embarking on this program as a service to the brewing industry. Our interest stems from the likelihood that aluminum would prove to be the most practical material for beer cans, bottle crowns, and barrels if atomic sterilization is successful."

Although we take a dim view of anyone tinkering with our suds, we have to admire Mr. Reynolds' progressive approach.

The Russians haven't laid claim to inventing flotation, at least not yet as far as we know, but they're anxious to have you know that they've got the most efficient flotation machines in the world. We'll have to take their word for it because of course, they don't release any figures. At the risk of exciting the junior Senator from Wisconsin, we have published this and other equally subversive information on page 95. We think you might find it interesting though if only to get some idea of what the Soviets consider a high state of mechanization in their Kounrad copper mine. Just between us, we wouldn't be surprised if each flotation machine (in the acres of them pictured) didn't have a tovarisch hidden behind it, busily turning a hand crank. Even so the Kounrad crowd is a lot better off than the gang running the People's copper mines in the Urals. The reasons that the Urals division is in the People's Doghouse can be found on page 178.

Got caught in sniper fire again last month. We reported in this column that 410.5 oz. of lend-lease silver are still outstanding and a couple of sharpshooters zeroed us in. It should have been 410.5-million oz., of course. Thirty days, next case!

The annual AIME meeting has come and gone, leaving us tired and behind in our work. Next month we'll have a report of the goings on for you. For now we can only pass along a couple of things we overheard. The first, probably the worst pun in history, was used by an elderly man in a blue pinstripe suit, greeting a friend from Louisiana with "How's bayou?"

Another fellow was telling his friend that he dropped a small fortune in the market—his shopping bag broke at the A&P.

According to a Geological Survey news release, a new vanadium mineral previously unknown to science has been found at the Monument No. 2 mine in Arizona. In honor of the Navajo indians on whose reservation the mine is located, the geologists are calling it Navajoite (rhymes with "never-go-tight" or possibly "have-a-quoit"). The Survey makes it clear that navajoite "is not considered a good vanadium mineral," which we think is a dirty shame. The least they could do is rename carnotite after the tribe instead of some fourth string vanadium mineral. Write your Congressman.

The E&MJ Chowder and Marching Society met last month to discuss a change in the name. The meeting, held in front of the $2.00 window at the Jamaica racetrack, opened with a rousing rendition of "April Chowders," the Society anthem. Proceedings were delayed when a nearsighted jockey threw a saddle over our Treasurer and a delegation had to be dispatched to the Judges Stand to get our fiscal man scratched from the 2nd race. Once under way, no time was lost in unanimously voting to change the Society's name to the E&MJ Chowder, Marching and Margaret Sullavan Society. If you get a chance to see her in her current play, "Sabrina Fair," you'll have a clearer idea of why we have elected this doll as the Society's "Girl We'd Most Like to Slurp our Chowder With."

Other business accomplished at this historic meeting was to set the date for the Annual March across the street to Grogan's Billiard Salon. Naming of the "Chowderhead of the Year" was tabled pending word from outlying precincts. Nominations are now being received at Society headquarters.

We surmise that our old beachcomber friend has been trying to borrow money again. He tells us that old bankers never die—they just lose interest.

ENGINEERING AND MINING JOURNAL

MARCH 1954

Can We Agree On Tin?

AT THIS WRITING, there is at least considerable doubt that the proposed International Tin Agreement will be ratified by the United States. There is also considerable doubt that the agreement could be made to work if the United States, the principal consumer, did not ratify it. For a discussion of the probabilities, see p. 100.

But ratified or not, the Tin Agreement is worth your attention because it is a symptom of a world-wide malady that cannot be cured simply by quashing this agreement, or any of the like agreements that will certainly be offered in the future to cope with various materials' supply difficulties.

The world has a problem, largely growing out of the war, of achieving a freer exchange of the world's currencies and a more equitable distribution of the world's goods and services. The U.S. of course isn't wholly responsible for creating this problem and in fact this country has done rather more than its share of developing a solution to it. Nevertheless, a position of world leadership does demand extraordinary endeavors.

How strange it is, then, that in the field of raw materials, the United States has done much to increase the complexity and severity of the problem. In tin, for example, the U. S. Government's arbitrary action during 1951 upset the tin market, drove tin prices sharply lower in all trading centers, and put the fear of Uncle Sam into tin producers all over the world.

The tin producers have long favored the stability of a cartel type of cooperation because they were tired of trying to adjust to market swings generated in the free market. In addition to wanting an agreement that will stabilize markets, they now want protection from the possible upsetting influence of the United States. One can hardly blame them.

Our own feeling is that it is unfortunate that this Tin Agreement bears so strong a resemblance to the old International Materials Conference operation, or to the international buffer stock idea of the Paley Report. It would be easy to condemn the Agreement on that basis out of hand, because we have had so many horrible examples of the effect on metal markets of government intervention.

We do feel, however, that some sort of international agreement is needed if for nothing else than to guard against the violent upsets that government actions can cause. The recent histories of the tin, the zinc, the lead, and the copper industries are all eloquent in this respect.

Is the best way, after all, simply to keep governments out of metal markets altogether? Quite possibly, but can we hope for that? With the world in its present shape, we can hope for it, and work toward it, but that goal isn't easily attainable.

Therefore, let's consider the Tin Agreement carefully, note its good and its bad points. Perhaps there's something there worth saving.

CHARLES P. TAFT, President
Committee For A National Trade Policy,
Cincinnati, Ohio

Foreign Trade Must Be Increased

Where do you stand in this debate on mineral policy? Check your views against those expressed recently by

Charles P. Taft, a brother of the late Senator Robert Taft, is president of the Committee For A National Trade Policy, a businessmen's free trade lobby with headquarters in Washington, D.C. As part of his activities, he is registered with the Justice Department as an agent of the Venezuelan Government in seeking lower tariffs on oil imports.

Mr. Taft is an independent Republican, long identified with anti-tariff interests. He is active in civic reform in Cincinnati, has served in that city's council for two years, and is talked of as a candidate in the forthcoming Ohio Republican Senatorial primaries.

THE FEAR of what is going to happen from imports is something that is quite characteristic of discussions in the field of foreign trade. This fear, however, is not always justified. I cannot accept the inference which my friend, Mr. Fletcher, gives, not only last December in Washington but in all of his talks, that if imports are allowed to come in, or if the tariff is not increased, the zinc and lead industries of the U. S. are going to fold up.

The best estimate I can make of the low-cost production of both lead and zinc is that without any tariff, certainly there are 300,000 tons a year of lead and 475,000 tons of zinc that would be produced in the U. S. in competition with anybody. I stand by this even after receiving a memorandum from Mr. Fletcher questioning my statement.

Now, maybe you don't make as much profit, but I am talking about living and continuing and running a business in the black. If you can develop all sorts of new methods and new discoveries in exploration, as Mr. Fletcher says, you can also do it in production.

One of the difficulties in producing zinc, so far as the Central States area is concerned, is that they are still using horizontal retorts, which is not one of the most advanced methods of smelting zinc. There certainly is room for technological advance in some parts of the zinc industry.

I insist that we are not going to *lose* those industries; part of them, perhaps, and that I am willing to discuss, but let's not talk about losing all of both industries. The figures of production I cited don't take into account secondary production, which for lead is very large, well over a third. For zinc it is much less, of course.

Now, the main question with which I want to deal is: Can we supply our essential basic raw materials from within the United States?

It seems to me the answer is perfectly simple; we cannot. Maybe supplies from outside are uncertain. I wouldn't argue about that. They are. But I don't think we ought to blame foreigners for *all* the hoarding and speculation on trends of prices.

Supplies are uncertain; our job is to make them more certain.

There are three categories of our raw materials. First, we have ordinarily plenty of coal, plenty of lumber, plenty of sulphur, plenty of molybdenum, and plenty of short staple cotton.

I am not going to get into an argument on whether we are a have or a have-not nation. I am very practical and I am talking about practical issues. Whether or not our reserves are being exhausted, and I am assuming they are not, the fact is that we now import 7% of our iron ore, 31% of our primary copper, 25% of our primary lead, 52% of our primary zinc, 11% of our wood pulp, and 12% of our oil.

That is the second category. There is a third raw material category. We have no chrome. We have no tin. We have no cobalt. We have no nickel, graphite, quartz crystals, or tantalum. We have only 4% of our manganese needs and 1% of our mica and 15% of our mercury.

In spite of these necessary imports we are in fact closer to self-sufficiency than any other major power except, perhaps, Russia. But in fact, our production at home of nearly all of these materials in the second and third categories represents, and has represented for four years at war and eight years of so-called peace, progressively less of our total consumption demands.

If we went back into war, domestic resources would be even less adequate. We wouldn't be, and we could not be, self-sufficient. Certainly we should en-

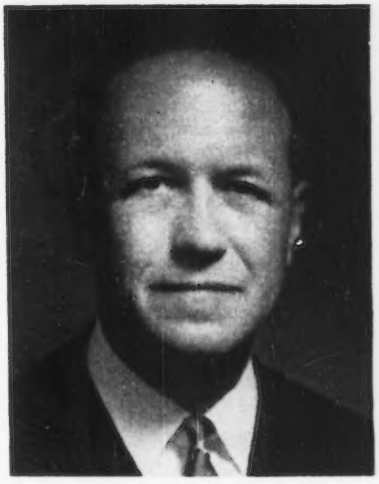
(*Continued on p 74*)

Mr. Taft says:

"The fear of what is going to happen from imports . . is not always justified. I cannot accept the inference that if imports are allowed to come in, the zinc and lead industries of the U.S. are going to fold up."

More—Not Less—Domestic Production

Messrs. Taft and Fletcher before the Colorado Mining Association meeting in Denver, Colo.



ANDREW FLETCHER, President,
St. Joseph Lead Co.
New York, N. Y.

Andrew Fletcher, president of the St. Joseph Lead Co. and president for 1953-54 of the AIME, founds his convictions on "the innate strength of old, established American principles."

Campaigning actively on behalf of his belief in supporting a livelier U.S. lead and zinc industry, he has spoken forthrightly on this topic before audiences over nearly all the world.

Leaving his first love, shipbuilding, he came to St. Joe as a trustee in 1921, becoming vice-president and treasurer in 1929. Aside from his work with St. Joe, he is active in community affairs in Mendham, N. J., in the Industrial Hygiene Foundation of America, the American Mining Congress, and the AIME.

ONE OF THE FUNDAMENTAL DIFFICULTIES which the U. S. mining industry faces, in addition to world over-production and the resultant low metal prices, is that we do not have sufficient public relations representatives to convince the majority of the people of the United States that it is for their own best interests to maintain local production of raw materials at a sufficient level to dominate our domestic market, nor do we have enough votes to convince Congress that some solution must be found to offset the higher cost of production in our country.

Following the talks that I made during the last year, both inside and outside the United States, many people have wondered why I, as president of the largest domestic producer of lead, should take such an active interest in measures to develop and maintain a strong domestic industry, composed of many small independent producing units as well as the large low-cost companies. St. Joe can meet foreseeable competition, but it would be a most unfortunate day for St. Joe if domestic production were reduced to only a few companies.

I have also been asked why St. Joe has made large investments in properties outside the United States. It is because metal can probably continue to be mined there cheaper than in the United States, and because world requirements will continue to increase over the years, and new mines must be developed. St. Joe is not and does not expect to be a large importer from its foreign investments.

Forgetting for the moment the domestic miners' desire to stay in business, I wish to emphasize that it is definitely to the advantage of the consumer to have a supply of raw materials, just as it is for the defense of our nation. I will deal with lead and zinc, because I am most familiar with them, and because they are typical.

In the days prior to World War II, when lead and zinc had a tariff protection that amounted to 36% to 42% of the selling price of the metal, the United States produced all of the metal that was required for its own consumption. Although our costs increased, the Roosevelt and Truman Administrations cut the tariff until now it amounts to only 6% to 8% of the selling price.

The result of this unwise policy is that instead of our domestic mining industry increasing its production through the development of our great natural resources to equal the demands of our increasing population, our production has been curtailed and replaced by greatly increased imports.

In my opinion, this change is not for the benefit of the domestic consumer. Imports cannot be considered as a reliable supply.

For example, in 1951 when industrial activity was high and the United States needed lead, total imports were 220,000 tons. In 1952, with roughly the same consumption requirements as in the previous year, lead imports amounted to 630,000 tons.

The alternate starvation and flooding of our markets by foreign suppliers is a major factor in the wide price fluctuations of metals. In 1951, the price rose to 19c a lb to drop within a year to 13½c. Under similar circumstances, in 1948 and 1949, lead dropped from 21½c a lb to 12c a lb within a six months' period.

In my opinion, the trade policy that our country should follow is to have more, not less, of domestic raw materials. It therefore greatly disturbed me when I listened to the address of Mr. Taft at the Resources for the Future Conference in Washington, D.C., Dec. 3, 1953, and read the release of his address in Denver on Jan. 28, 1954. He is a man of high integrity and honest belief, and the

(Continued on p 75)

Mr. Fletcher says:

"Look at the domestic lead and zinc industries. Was our fear justified or not? We are talking here about what did happen as a result of imports, not only of what may happen."

Foreign Trade Must Be Increased (*Continued from p 72*)

courage exploration in the U. S. and on the North American continent for all items in which we are short. However, even high-cost payments for domestic production, as against low-cost payment for higher-grade foreign production, could not make us self-sufficient. We don't want to race for self-sufficiency. That would certainly undermine our standard of living and help to produce war.

If, on the other hand, the argument of Mr. Fletcher is based solely on national defense, then why are not Canada and Mexico just as good war sources as the United States?

So my conclusion is that we have to rely on foreign resources to some important degree, even in foods and fibers, and we are deeply concerned to make them readily and safely available, especially those important in war.

Fred Dewhurst, of the 20th Century Fund, in his extraordinary 1947 book, "Needs and Resources," estimated in 1946 that our population for 1950, only four years later, was going to be 145-million. It was 150-million. So our gross national product has zoomed, in considerable part because we had no idea how many babies we could produce if we tried. 3,500,000 of them a year means more materials, and more, and more.

There is a further element involved. If foreign countries also grow in their industrial development, as we now can expect, they are going to seek to protect their own reserves and production and to compete for other world resources. Even more obviously, therefore, we are concerned for our future, since we must rely increasingly on some of these same foreign resources for this new population and new demand in the U. S.

Now, many of the necessary imported materials I have listed come from Canada and Mexico: 50% of our lead imports, 80% of our zinc imports, from those two. Some come by short-hault from Latin America, but some come from a lot farther. Thus, sea power is still a major necessity of defense, and we'd better worry just as much about Russian submarines as about their atomic bombs if we get into a war.

Certainly, as I have just suggested, we should subsidize by contract exploration for those minerals that we need the most, just as we did during the war. I would submit in spite of what Mr. Fletcher says that we should subsidize by contract truly marginal higher-cost mines, where the national interest and security really require it in order to have working mines at once, in case of war.

As outstanding an authority as Dr. C. K. Leith said sometime back, and he didn't deny it when I quoted him in December, that an adequate stockpile gave plenty of time for marginal mines to get into production. That helps to define what I mean by "truly marginal," those you need which *can* open before an adequate stockpile runs down. I think I am correct in saying that one of the industry problems, as it is in coal, is that even slight price increases do actually open marginal mines and do add to a surplus that can then accentuate a swing if it comes in the other direction.

Mr. Fletcher says you can't turn mines on and off. Some of the marginal mines do exactly that.

There is no need, certainly, to keep all the highest cost mines open. The sliding scale tariff that Mr. Fletcher and Mr. Wormser have advocated for some time past, which was included in the defeated Simpson Bill of last session, I submit, is a thoroughly bad remedy. It seems to me that responsible industry leaders should come up with something better.

Mr. Taft says:

"Without any tariff, certainly there are 300,000 tons a year of lead and 475,000 tons of zinc that could be produced in the U.S. in competition with anybody."

Mr. Taft says:

"Can we supply our essential basic raw materials from within the United States? It seems to me the answer is perfectly simple. We cannot."

I understand that on this there was a division of opinion at the Washington Conference in December, and that there are some, at least, who state they are no longer backing the sliding tariff, or if you prefer, the sliding anti-dumping tax. Whichever it is, it is a bad kind of an operation, because it attempts to produce a stable, high price in the United States at the expense of foreign producers, especially our friends in Mexico and Canada.

It would undermine and perhaps destroy these mines through continuously fluctuating prices, those being the very enterprises upon which we must rely strongly in time of war.

Those who are advocating this tariff had better be certain also that the price of 15c, which it is supposed to produce for zinc, would actually help them. Zinc at 19½c is not coming back in a hurry. Some mines need even a higher price than that.

Not only that, this tariff would produce immediate reprisals, and justifiably so. It is one more piece of what can only be described as economic warfare that has been going on among the Allies, and particularly Canada and the United States.

It's extraordinary that pressure for tariffs comes from people who abhor Socialism and object to any slightest criticism of the free enterprise system. What they are demanding, like the lead and zinc industry, is further government intervention for their benefit.

Any tariff *is* government intervention, not quite in harmony with a free-enterprise system. Sometimes the tariff has to be used, but don't forget that tariff *is a concealed subsidy*. This is no doubt why so many prefer tariffs. Only the few direct consumers kick about a tariff. The direct subsidy is out in the open where it has constantly to be justified. In the case of a metal like manganese, of which we import 96%, the injustice certainly becomes crystal clear to those who use 96% of the consumption and pay a tariff for the benefit of the producers of 4%.

The tariff and quotas, too, for that matter, have as their principal result the raising of the price to protect the high-cost producer. And since St. Joseph Lead in southern Missouri, or New Jersey Zinc in the East, have well-operated low-cost mines which can compete, they are not in that category. They are low-cost, therefore, the effect of the tariff is to increase their profit margins.

Mr. Fletcher discusses average costs. This, it seems to me, is quite beside the point, because there is no such thing as an average cost. Sure, you can do it mathematically, but what good does it do you?

You have costs that range from the marginal producer down to the very profitable low-cost producer. The assumption and in fact the statement that our costs in the United States are generally higher is absolutely incorrect, with the exception of a few areas. In general, our technology puts us away ahead.

The proposed sliding scale tariff on lead and zinc, it has been estimated, would add to our consumer costs in the domestic market something around $200-million. A subsidy would only be a fraction of that. It

(*Continued on p 76*)

More – Not Less – Domestic Production (*Continued from p 73*)

remarks which I make here should not be considered as personal reflections on him, but rather as comments on the views of the important trade association that he represents.

Mr. Taft says: "The fear of what is going to happen from imports" of lead and zinc, about which I and other representatives of the mining industry have been talking, "is not always justified." Look at the domestic lead-zinc industry. Was our fear justified, or not? We are talking here about what *did* happen as a result of imports, not only of what *may* happen.

Even though in Washington I told Mr. Taft that his statement "without any tariff, certainly there are 300,000 tons a year of lead and 475,000 tons of zinc that could be produced in competition with anybody" was misleading, I note that he makes exactly the same statement here. St. Joe cannot produce such tonnages, and the additional tonnage that can be produced by other low-cost companies at a profit under prevailing prices is small. With the present 6% to 8% tariff, I would think the maximum tonnage that could be produced at a profit would be 200,000 tons of lead and 300,000 tons of zinc. Mr. Dick Young, of American Zinc, has told me that 100,000 tons of zinc would be nearer the mark.

However, assuming for the moment that Mr. Taft is correct, is it advisable to produce in the United States only 30% of our lead requirements, instead of the 60% that prevailed in 1951, and only 49% of our zinc requirements, instead of 75%. When percentages drop to such low figures, our markets will depend on imports, and we might experience the same difficulty as during the Korean War, when because of ceiling prices, Canadian and Mexican production, which normally came to our markets, was shipped abroad where higher prices prevailed.

Mr. Fletcher says:

"If our country . . . develops a method for offsetting the higher cost of domestic production, it would be possible to produce more, not less, of our lead and zinc requirements, and to approach the level we had prior to World War II."

Mr. Taft once more refers to "using horizontal retorts, which is not one of the most advanced methods of smelting zinc." The technological advance advocated by him as a solution to our problem cannot be made without large expenditures. For example, to build a St. Joe electrothermic zinc smelter under present conditions, without an acid plant, would probably cost in the neighborhood of $50,000 per ton of concentrates, and an electrolytic plant about 100% more. Amortization expense for a new plant would probably vary between $9 per ton of concentrates to $15. No wonder that horizontal retort plants, which have been fully depreciated and have low-cost gas contracts, can compete, as evinced by the fact that 35% of the 1952 U.S. zinc production was produced in horizontal units.

Mr. Fletcher says:

"With the present 6% to 8% tariff, I would think the maximum tonnage that could be produced in the U.S. at a profit would be 200,000 tons of lead and 300,000 tons of zinc annually."

Mr. Taft asks the question, "Can we supply our essential basic raw materials from within the United States or not? It seems to me the answer is perfectly simple, we cannot."

I am forced to admit that if the present Administration permits our State Department to carry on the policies of the Roosevelt and Truman Administrations, Mr. Taft is correct. In fact, he becomes righter and righter every passing week, but if our country realizes the fallacy of such a policy and develops a method for offsetting the higher cost of domestic production, then, in my opinion, it would be possible to produce more, not less, of our lead and zinc requirements, and to approach the level we had prior to World War II.

Mr. Taft says, "If foreign countries also grow in their industrial development, as we now can expect, then they are going to seek to protect their ore reserves and production and to compete for other world resources."

If the outlook is for a diminishing foreign supply, it is difficult for me to see why Mr. Taft does not believe that the United States should encourage domestic production, instead of having a trade policy that lessens it.

I cannot agree with Mr. Taft's statement based apparently on what Dr. Leith told him "that an adequate stockpile gave plenty of time for marginal mines to get into production."

It is of course difficult to comment without knowing just what Mr. Taft means by "adequate." There is certainly a difference between, say, 1-million tons and 10-million tons. As I have repeatedly said, the best stockpile for us or any nation to have is a prosperous and strong mining industry, and I can think of no quicker way to hazard the safety of our nation than to let more and more mines flood, to have fewer young men come into the industry, to provide less incentive to find new ore reserves, and to develop little desire to maintain technical know-how or improve mining machinery. I still insist that you cannot turn a mine on and off like a water tap, and I certainly disagree with Mr. Taft's statement "some of the marginal mines do exactly that."

Mr. Taft refers to the sliding scale import tax as "a thoroughly bad remedy and it seems to me that the responsible industry leaders should come up with something better."

The industry *has* offered other remedies, for example:

1. Increase U.S. metal stockpiles

The world production of lead and zinc has been, and still is considerably in excess of world consumption. During the 5-year period of 1948-52, about 950,000 tons more lead and over 450,000 tons more zinc were imported into the United States than were consumed. Fortunately, most of this unneeded world surplus was placed in the U.S. stockpiles.

Purchasing the surplus world production, and keeping it from flooding the domestic markets, as has been the situation in the last few years, is one way of supporting the U.S. price level at a point where our miners can operate. The industry has not been in favor of this procedure, as it would only give temporary relief, and would have the tendency of maintaining world metal prices with resultant over-production outside the U.S.

2. Import quotas

This is a device used by many foreign nations and by the United States in respect to sugar, wool, and other commodities. Sugar is sugar, but there are many grades of metal and concentrates. Assuming for the moment that our State Department or some other Government agency could work out a fair allocation procedure for cutting imports by, say, 50%, a method for changing the quotas under changing U.S. consumption, deciding

(*Continued on p 77*)

Foreign Trade Must Be Increased (*Continued from p 74*)

is hard to estimate, obviously, but maybe a subsidy of $10- to $40-million, gives you some sort of comparable figure.

The subsidy method certainly has the highest direct relation to the objective at the lowest possible cost, and with the least damage to our foreign relations. Certainly, that is a statement of a sound principle to restrict government intervention in our economic system.

It seems to me a little shortsighted, from the industry standpoint, to encourage, through definitely higher stabilized prices, substitutes for zinc. This is certainly what the proposed price levels under the desired sliding scale tariff would accomplish in a hurry.

This lead and zinc proposal is a declared effort to return to tariff log-rolling in Congress. All responsible leadership in Congress for the last 20 years on both sides of the aisle has sought sincerely to avoid that most deplorable result. That applies to both Republican leadership and Democratic leadership, whatever may have been their position of principle on the tariff itself.

Now, I am certainly not proposing to neglect or ignore the damage that may come from imports. I would endorse government assistance on a temporary basis to communities to help in adjustment to new production. Certainly special measures are called for where damages occur in a one-industry town or community isolated from other job opportunities when tariffs are reduced that affect them.

I have a clipping from the New York Times of Nov. 1, 1953, and the date line is "Park City, Utah, Oct. 31, 1953." It has to do with lead and zinc mining and the effect of reduced production. It states, "Since other industries in Utah and neighboring states are prosperous, there is little or no visible hardship; the mine workers have been absorbed."

That happens in many cases. But even where there is hardship, then certainly the local community, the state, and the Federal government should take appropriate action.

There are 41 development commissions in the U. S., some of which have done just this kind of job. The Michigan Development Commission did it in the case of Iron Mountain, which first had trouble when the mines ran out. That does happen, in spite of the continued discovery of reserves elsewhere.

Then Ford put a plant there for wooden station wagon bodies. Then people didn't want any more wooden station wagon bodies, and Ford gradually closed out after having employed 5,000 people at the peak.

The local people and the state brought in new companies. Now they are employing about 50% more persons than they used to employ when Ford was there. That was partly local initiative, partly state intervention and help and guidance.

Now, a second element is needed to protect ourselves. We should encourage U. S. investment abroad by tax policy at home, and by negotiating for fairer treatment of all capital in foreign countries, both ours and their own, especially to help make certain of needed resources for our own economy.

Foreign nations themselves have to increase their productivity in order to get rid of exchange controls and in some cases of their tariffs and quotas. There are some foreign barriers which are extremely serious, the currency restrictions of the Sterling bloc, for instance. They have protectionists there, too, and they have to be vigorously traded down.

But the danger to world progress is not so much that excessive imports will damage us (they may to some small degree) as that foreign nations, in fact, cannot compete in our markets with many of their products, and therefore, cannot, by any mutual relaxation of barriers, earn more dollars to increase substantially their purchasing power from us. We are now beating Great Britain in Canada on quite a number of products, though they pay less tariff than we do.

Mr. Taft says:

"Mr. Fletcher says you can't turn mines on and off. Some of the marginal mines do exactly that."

But when foreign nations do their part, they have no chance to earn those dollars to buy our products unless we make this market predictable. We must get rid of the uncertainties in valuations and the remaining uncertainties in classifications, as proposed in the second Jenkins Bill. We must develop a policy upon which our exporters and importers and foreign exporters can rely for at least five years in advance. Surely, we cannot raise our tariffs at this time, but as to reducing them, stability is nearly as important as reductions in trade barriers by us or on the other hand by the other countries, too.

Stockpile purchasing has certainly not been used in order to promote this kind of stability. I am a little doubtful, I am frank to say, about the proposals for various sorts of international buffer stock operations. I wouldn't say that the Commodity Credit Corporation has been exactly an outstanding success in this general area. They still don't like to hear about potatoes or butter.

The basic essential for our national progress at home and abroad, is a wider economic education. The best program which deserves the widest support is that of the Joint Council For Economic Education, supported by the CED and the Ford Foundation.

Finally, we cannot forget that the base of all our natural resources is the men and the women who develop and use them. For coming generations we must find and develop from among all our boys and girls, without economic distinction, the highest potential of both hand and mind.

And that means, too, the cultivation of the leadership of strong personalities who can play on a team, but who will stand for requiring that the individual star, no matter how important, plays for the entire interest of the whole team, the people of the United States of America.

I might point out that one of the most important elements to promote foreign trade, both in our own country and abroad, is the problem of adequate transportation, especially at the point of handling processes. A person who should certainly know told me some little time ago that the rate now of the movement of goods from the point of origin where they are first produced, where they start as raw materials, to the ultimate point of consumption, is only about two miles an hour faster than in the horse and buggy days. This is primarily due to failures in the handling of goods. Better total transportation would greatly promote more effective foreign trade, and I am sure this applies particularly to heavy raw materials.

Mr. Taft says:

"If foreign countries also grow in their industrial development, they are going to seek to protect their own reserves and production and to compete for other world resources."

More – Not Less – Domestic Production (*Continued from p 75*)

what proportion of the imports should be metal and not concentrates, and then deciding what U.S. smelters should get for the various grades of concentrates. The result would certainly be more, not less, Government intervention. The procedure involves so many foreseeable difficulties, and so many unforeseeable ones will probably arise, the industry does not believe that import quotas are practical.

3. Subsidize U.S. production

This is probably the simplest method, and it would not be necessary to use the discredited World War II Premium Price Plan (which, by the way, Mr. Taft, certain labor unions, and some Government officials are once more advocating) but rather to pay a flat rate of 3, 4 or 5c per lb for all domestically-produced lead and zinc, as is now done for agricultural products, air mail, ship construction and operation, etc. There could be no great objection by foreign nations to this procedure, or by our own citizens. The objection by the domestic mining industry to subsidies is that the unneeded world production would not be curtailed, and in the end our Government will control the mining industry as our farmers are beginning to realize in respect to their properties.

4. Increase in tariffs

The Emergency Lead and Zinc Committee, which represents practically all the U.S. mines, has filed with the Tariff Commission a request for relief under the Escape Clause in the Reciprocal Trade Agreements, and hearings were held in Washington during November 1953. The maximum tariff, including the present negligible tariff, on this basis, would amount to 2.55c per lb on lead metal, 2.10 on zinc metal, and 1.80 on the lead and zinc content of the ore or concentrates. I do not think that under our high living standard, these rates will be high enough to maintain our industry at a production rate similar to that of 1951, but the increase is better than nothing.

Our foreign friends cannot object too strongly, as the rates that would be in effect would be just about the same as the existing Canadian rates on imports of lead and zinc.

5. Sliding scale tax or tariff

The reason why I, Mr. Wormser, and the industry have advocated this arrangement, is because it would give protection when it was needed, and there would be no tax or tariff when the domestic metal price indicated that the demand was in excess of the available supply.

Mr. Taft is mistaken when he says that the Simpson Bill would have established a "stable high price," because in reality it would have established a "stable" ceiling. If the Simpson base, above which there would be no duty or tax, were, say 15c, then this would have been the ceiling, because foreign producers would be willing to sell at 15c with no duty or tax. Also, if the European producer is willing to sell zinc in the U.S. market at 9c, he would certainly be willing to sell at a net of 11c, which he would obtain even if he paid a tax or duty of 2.5c when the domestic market was 13.5c per pound. My remarks about zinc also apply to lead.

Mr. Fletcher says:

"If the outlook is for a diminishing supply from abroad, it is difficult for me to see why Mr. Taft does not believe that we should encourage domestic production instead of adopting a trade policy that lessens domestic output."

I do not know where Mr. Taft gets his estimate of "$200-million" as being the cost of a Simpson Bill, because even if the zinc price were increased 5c per lb, the increased cost to the consumer would be $100 per ton times one million tons or $100-million, and if lead were increased 2c or $40 per ton times 1,200,000 tons, the additional would be $48-million, a maximum total of $148-million, not $200-million.

I cannot refrain from commenting that even $148-million will prove to be a relatively small additional cost to the U.S. consumer compared to what he would have to pay if we shut down a major portion of the U.S. production and are dependent on imports!

A fixed tariff rate, that was not reduced when the domestic price increased, would not, in my opinion, be as fair for the consumers and our foreign friends as a sliding scale basis.

The American Metal Co., which has no domestic production, and which up until a short time ago had proposed a reinstatement of a subsidy along the lines of the Premium Price Plan, as suggested by Mr. Taft, has now switched to a sliding scale nondiscriminatory subsidy plan, which is tied in to stockpiling. The "dollar" assistance to the domestic miner, if a plan of this type should be adopted, would probably be about the same as under a sliding scale tax or tariff plan. My objection to it is that it would be paid by the American people at large and not by consumers. It would not curtail surplus world production or excessive imports.

I cannot agree with Mr. Taft's statement that a "tariff is a concealed subsidy." Certainly the consumers know what the amount of the tariff is, just as do the miners. The earnings of St. Joe, as well as the other mines in the United States, will, of course, be increased by a tariff, otherwise there would be no point in having a tariff, but at least 50% of any increased earnings is paid back in taxes to the Government, and none of the disadvantages of a subsidy plan would be experienced.

Mr. Fletcher says:

"I still insist that you cannot turn a mine on and off like a tap, and I certainly disagree that some of the marginal mines do so."

It is unfortunate that Mr. Taft's source of information about mining in the United States is not more competent, because if it were, he certainly would not say, "The assumption and in fact the statement that our costs in the United States are generally higher is absolutely incorrect, with the exception of a few certain areas."

There are published articles by Mr. Pehrson of the Bureau of Mines, and Mr. Shea of Tennant, which indicate that the combined lead and zinc grade of ore in foreign mines averages approximately twice that in the U.S. mines. Therefore, we have to mine about two tons of rock for each ton mined outside, and with our prevailing standard of living, the cost per ton is higher, even when transportation costs to our market are incurred by foreign producers. If this were not a fact, why would our markets be flooded by imports, or why are U.S. mines being closed down?

Anyone who has visited Canadian mining centers, the Trail smelter, and the fine mining, milling and smelting units in Australia, Tasmania and in Europe, will quickly realize that their technology is just as good as ours. Insofar as mining in South America and Africa is concerned, full advantage has been taken of recent developments in equipment and procedures.

When we comply with Mr. Taft's

(*Continued on p 196*)

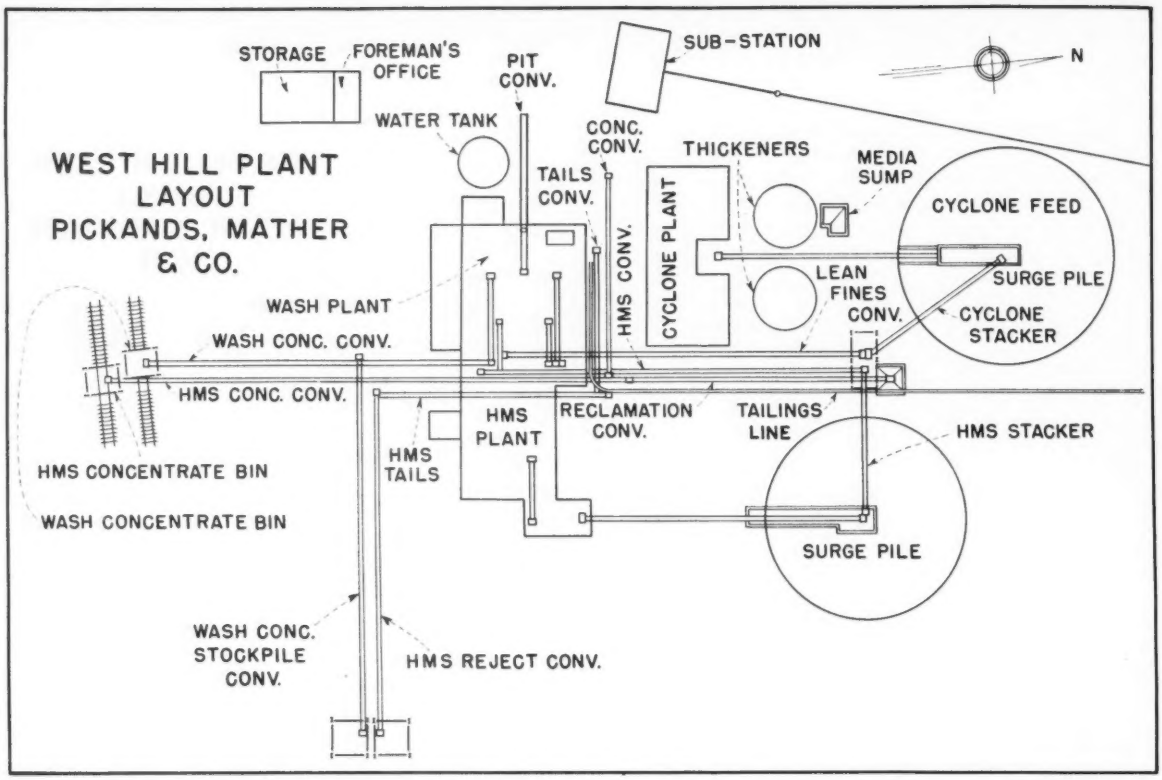


FIG. 1. Completed in July 1953, the West Hill plant is designed to handle both straight wash and heavy density or jig ores, separately or in any combination. Designed for 700 long tons per hour, it has treated over 1,900 tph.

Modern Plant Will Treat Mesabi Lean Ores

E. C. HERKENHOFF
Pickands, Mather & Co.,
Hibbing, Minn.

THE WEST HILL PLANT of the Western Mining Co., operated by Pickands, Mather & Co., is the newest and most modern of the growing number of beneficiation plants that treat Mesabi lean iron ores. After being placed in operation early in July 1953, plant performance has met expectations and promises to exceed them in the future.

The West Hill mine is located about two miles west of Coleraine and is the westernmost producing mine on the Mesabi. It is adjoined on the west by the Lind-Greenway mine of Jones & Laughlin Steel Corp., which at present is under development. The West Hill's eastern neighbor is the Buckeye mine of the M. A. Hanna Co., where, it is interesting to note, the first commercial cyclone separation plant was placed in operation in 1951.

The ores of the West Hill mine are of two types: straight wash and heavy density or jig ores. Both types require processing and the plant is designed to handle either type or combinations of either type.

Development of the open pit mine began in December 1951 and proceeded at a steady pace until July 1953. Plant construction began in September 1952 and met the completion date of July 1953. The mine and plant are under the supervision of L. M. Becker, mine superintendent, and E. J. Fearing, general superintendent of the Western Mesabi District for Pickands, Mather & Co. George Paul is plant foreman.

The plant engineering design and erection were by the North Central District office of Western-Knapp Engineering Co. to the flowsheet specifications of Western Mining Co. J. J. Sheppard is chief engineer for Western-Knapp's North Central office.

Plant Flow Scheme

The plant flow scheme may be divided into four sections as follows:

(1) Pit screening and crushing section.

(2) Washing section

(3) Heavy-Media section

(4) Cyclone concentrator section (to be completed in 1954)

The processes used may be considered conventional, but the plant design incorporated several new features which will be described in detail.

Fig. 1 is a plan view showing the general arrangement of the entire plant. Fig. 2 shows the layout of the wash and Heavy-Media sections. The flexible flowsheets (pp 80 and 81) permit the treatment of various fractions

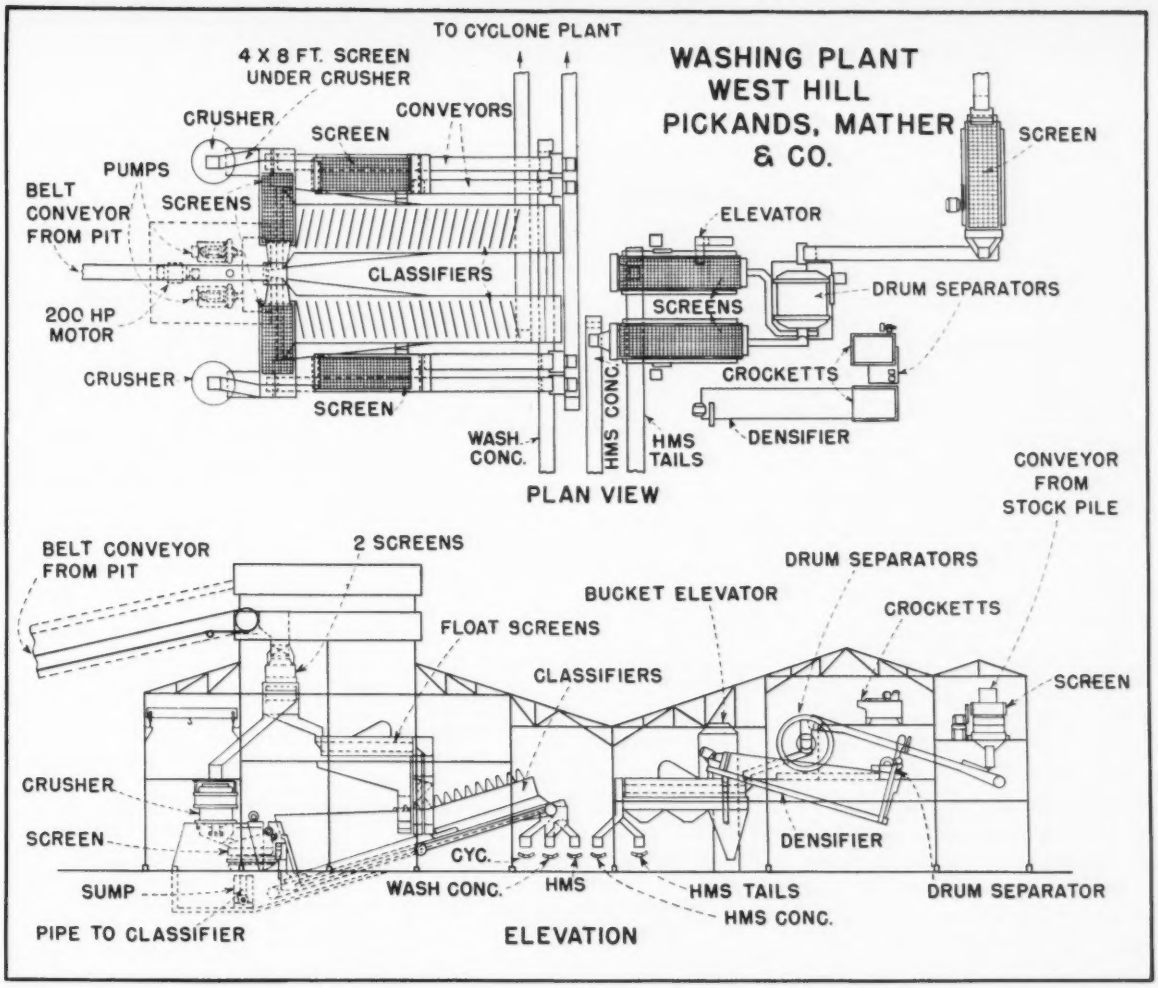


FIG. 2. Throughout plant economy of structure and better interior visibility simplify operations. Use of floor gratings throughout also contributes to better housekeeping. Medium consumption here was below 1.0 lb per ton in 1953.

of the ore by either straight washing, Heavy-Media, or cyclone separation. Fig. 3 shows an elevation of the cyclone section which is now under construction.

This plant was designed for a capacity of 700 long tons of ore per hour and easily attained this figure. In fact, feed rates of over 1,000 tph were attained. The designed capacities of the various sections of the plant are as follows: Crude ore, 700 tph; Heavy-Media feed, 220 tph; cyclone concentrator feed, 160 tph.

Ore Treatment

Crude ore, dumped by 20-ton trucks into the pit plant hopper, is fed to a 6x12-ft Tyrock F-900 scalping screen by a 5x17-ft pan feeder. The plus 4½-in. material passes through a 42 x 48-in. jaw crusher and, optionally, may join the scalping screen undersize or be diverted to the rock reject bin when lean or refractory. The screen undersize is delivered to the main slope belt by a 36-in. x 10-ft speedup belt.

This speedup belt takes the place of a conventional pan feeder. Travelling at the same speed as the main belt, it takes the brunt of the wear resulting from accelerating the load, thus minimizing wear on the long, expensive slope blet.

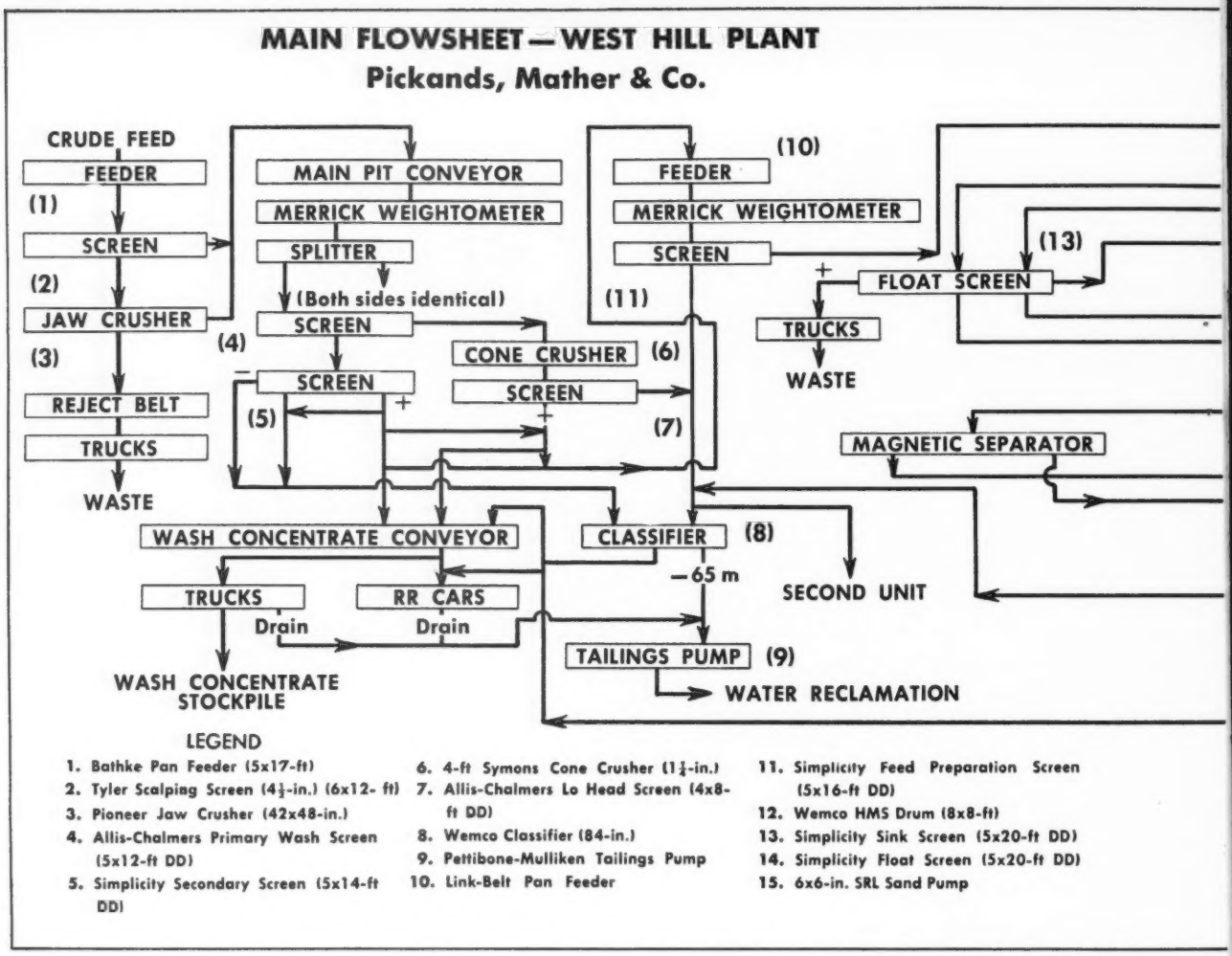
The 42x48-in. Pioneer jaw crusher, with welded steel frame, is the largest overhead eccentric type crusher on the Range. It is driven by a 150-hp slip ring motor.

Referring to Fig. 2, the screened and crushed ore is delivered dry to the head box of the plant. Water is added and the pulp stream is split to two identical sections, each section providing the following treatment:

The pulp passes over the primary wash screen having 1¼-in. top deck openings and a troughed lower deck with ⅝-in. openings. The plus 1¼-in. fraction is chuted to a 4-ft Symons crusher and the crusher product is washed and dewatered on a 4x8-ft double deck screen. Screen undersize (minus 10 mesh) is pumped to the 84-in. classifier. Oversize is conveyed to join the other coarse fractions.

In many cases, the plus 1¼-in. fraction of Mesabi wash ores is lean and requires gravity concentration, whereas the minus 1¼-in. fraction may wash up to a satisfactory product. The West Hill flowsheet allows the operators to check the quality of the cone crusher product visually and divert it to Heavy-Media treatment if required.

The minus 1¼-in. fraction of the ore, after passing either over or through the bottom deck of the primary wash screen (for scrubbing only), goes to a horizontal double deck secondary wash screen. The plus ⅝-in. fraction optionally joins the minus ⅝-in., plus 3/16-in. fraction and may be sent to Heavy-Media or conveyed to the loading pocket. The mi-



nus 3/16-in. fraction is fed to the 84-in. classifier which makes a separation at about 65 mesh. The classifier overflow is a tailing and is pumped to the sludge basin. The classifier sand joins other coarse fractions and, if high grade, goes to cyclone plant.

In contrast with many of the large Range plants, the West Hill wash plant height is quite low. From ground elevation to the centerline of the head pulley is only 42 ft, 9 in. as shown in Fig. 2. This resulted in economy of structure and better interior visibility which simplifies operation. The reduction in plant height was achieved principally by separate screening of the cone crusher product and installation of the tailings pumps below the main floor grade. The cone crushers are mounted near floor level on concrete foundations, eliminating expensive steel supports and attendant vibration troubles.

The use of floor grating throughout the plant provides the operators with clear visibility, and contributes to better plant housekeeping.

The 84 in. x 42 ft Wemco spiral classifiers are the largest ever built for such purposes. The drive is 20-hp and speed is 5 rpm. The flights are equipped with longitudinal lifter bars and wash boxes are built into the dry-deck section of the tank.

Double deck horizontal screens, with specially designed washing and pumping troughs, are used extensively throughout the plant. All screen surfaces are woven wire, providing maximum open area. Screen openings for 1953 were as shown in Table I.

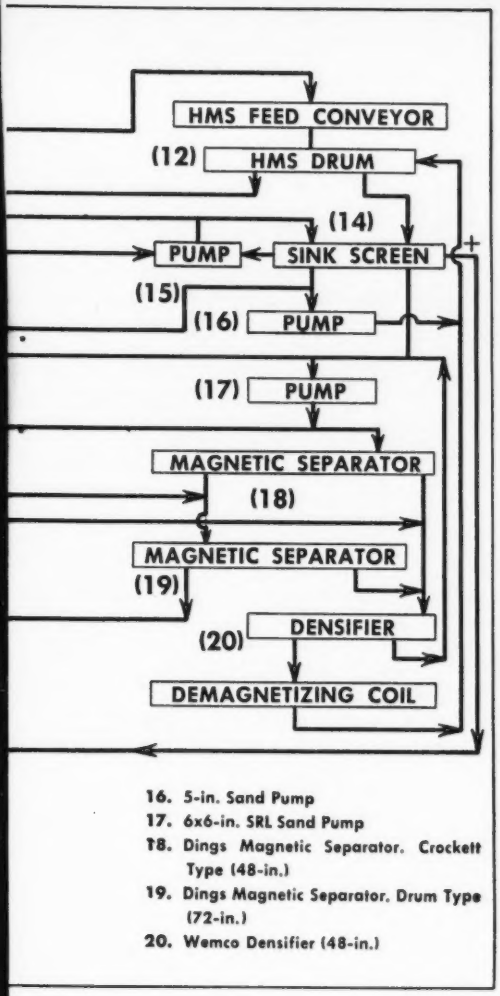
At present, the Heavy-Media section consists of one unit, treating feed having a size range of minus 1¼, plus 3/16-in.

Novel features of the Heavy-Media unit are the wash and drain screens and medium cleaning system. A sec-

Table I. Screen Sizes — West Hill Plant

Section	Screen	Top	Bottom
WASHING	5x12-ft Prim. Wash	1¼ in.	⅝ in.
	5x14-ft Sec. Wash	⅝ in.	3/16 in.
	4x 8-ft Crusher Product	3/16 in.	.090 in.
HMS	5x16-ft Preparation	⅝ in.	.206 in.
	5x20-ft Drain and wash* (Fig. 4)	.40 in.	.104 in.
CYCLONE	6x16-ft Dewaterizer	.0098 in.	(S.D.)
(FUTURE)	5x10-ft Drain screens	.025 in.	(S.D.)
	5x10-ft Tramp screen	.025 in.	(S.D.)

(*) First 5 ft is single deck covered with 2½ mm Wedge-Bar cloth.



16. 5-in. Sand Pump
17. 6x6-in. SRL Sand Pump
18. Dings Magnetic Separator, Crockett Type (48-in.)
19. Dings Magnetic Separator, Drum Type (72-in.)
20. Wemco Densifier (48-in.)

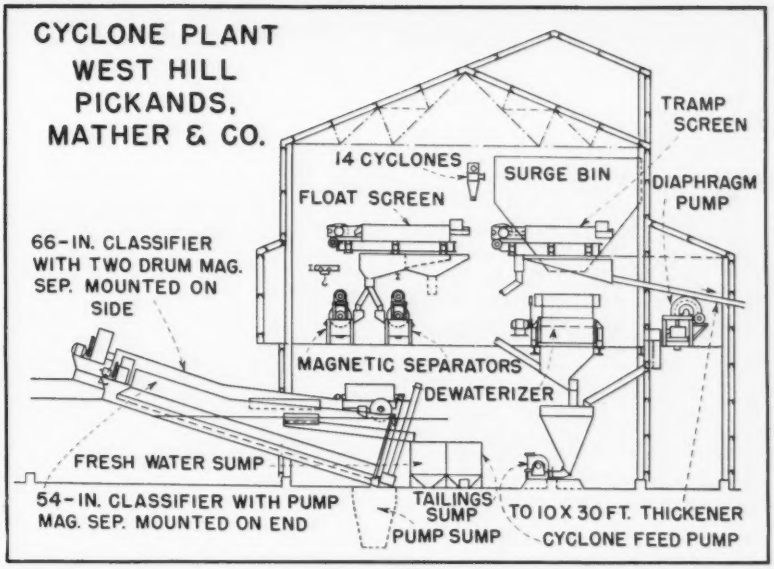
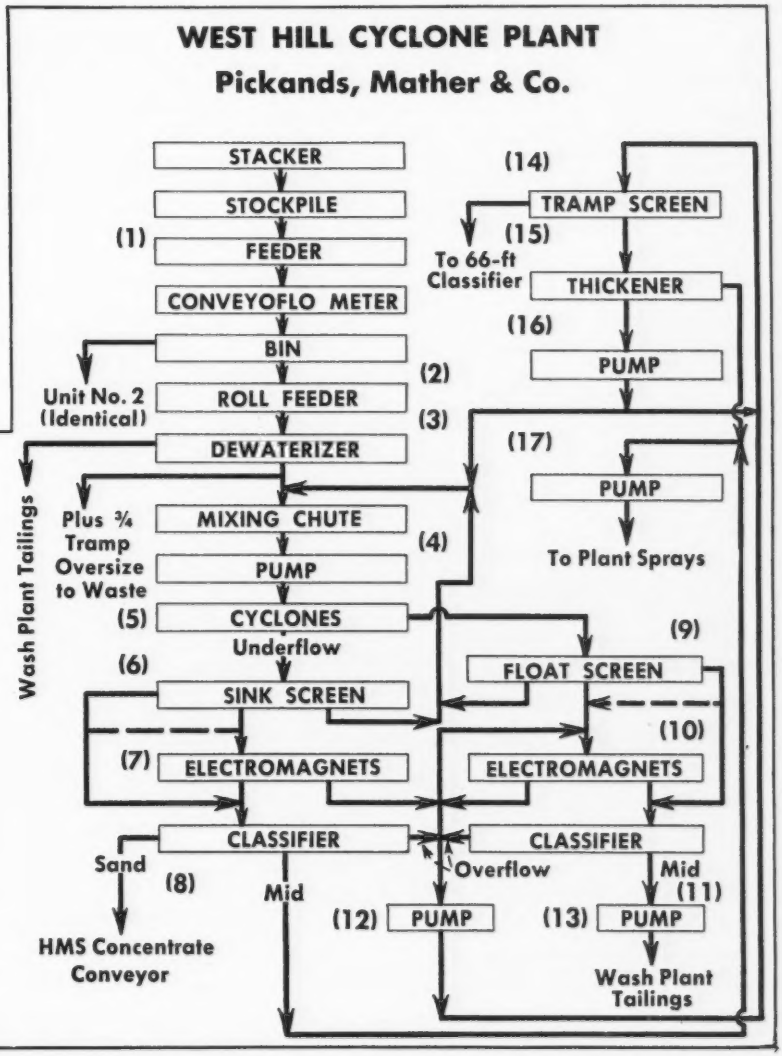
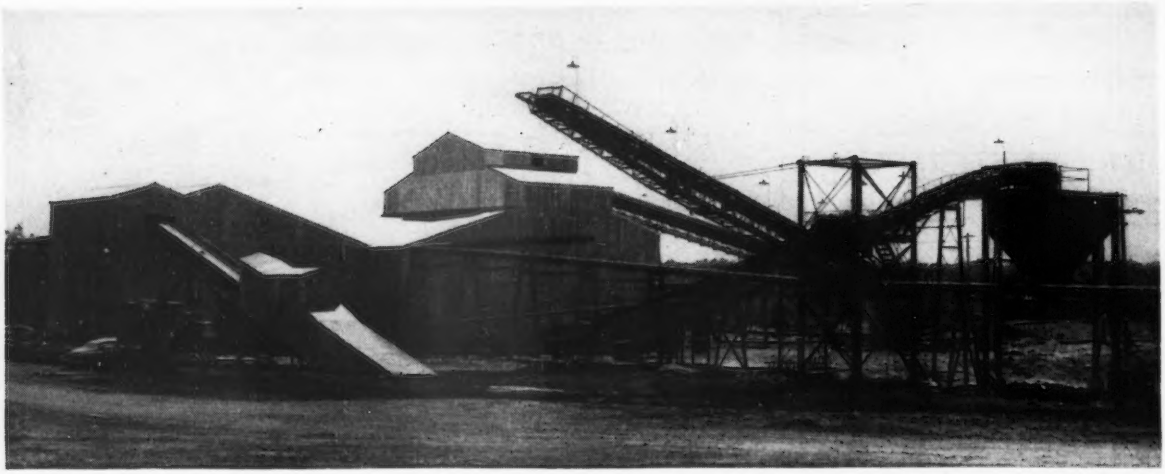


FIG. 3. Cyclone section, now under construction, will be in operation early in 1954. Cyclones will be built of cast Ni-Hard by the Staver Foundry.



LEGEND

1. Simplicity Vibrating Feeder
2. 16-in. Wemco Roll Feeders
3. Hewitt-Robins 6x16-ft Dewaterizer
4. Wemco 6-in. Sand Pump
5. Two Erie 14-in. Cyclones
6. Symons Sink Screen (5x10-ft SD)
7. Electromagnet (30x72-in.)
8. Wemco Classifier (54-in.) containing 30x60-in. Alnico Magnet
9. Symons Float Screen (5x12-ft SD)
10. Electromagnets (30x60-in.)
11. Wemco Classifier (66-in.) containing 30x60-in. Alnico Magnet
12. 5-in. Hazleton Pump (Vertical)
13. Allis-Chalmers 4-in. CW Pump
14. Symons Tramp Screen (5x8-ft SD)
15. Hardinge Thickener (10x30-ft)
16. 6-in. Deco Triflex Diaphragm Pump
17. Allis-Chalmers 5-in. CW Pump



Low building, only 42 ft. 9 in. from ground to centerline of head pulley, departs from Range practice. Crushers mounted near ground level on concrete foundations, don't require extensive steel supports with attendant vibration.

tion through one of the 5x20-ft wash and drain screens is shown in Fig. 4. Here it will be noted that the long wearing features of Wedge-Bar are utilized in the first 5 ft of the screen where wear is at a maximum and ample drainage of medium can readily be obtained even with a minimum of open area.

The remainder of the screen is divided into alternating troughs and screen panels, utilizing two decks. Here the medium is thoroughly scrubbed and washed from the products by applying the wash water in counterflow principle.

Fresh water added near the discharge end of the screen is collected in a separate sump and is pumped back to the head end of the washing section of the screen and is applied at the troughs of both decks through 3-in dia pipe distributor headers having ½-in. round openings (ordinary sprays cannot be used because of the solids content) spaced on 6-in. centers. Thus, the wash water provides double washing and lowers the attachment loss of medium. So far as is known, this plant is the first on the Range to employ counterflow washing although the practice is common in coal separations.

All present Range Heavy-Media plants use single deck wash and drain screens. The use of double deck screens minimizes the depth of ore on the screen surface and greatly reduces the attachment losses of medium. Wire cloth provides high percentages of open area and the division of load protects the bottom deck cloth from undue wear.

It will be noted that the wash water is not thickened before going to the magnetic separators. However, ample magnetic separator capacity was provided in the form of two 48-in. Dings HM electro machines. The combined tailings go to a 24x72-in. Dings permanent magnet secondary separator. This type of separator has been in common use in Europe for ferrosilicon recovery but the West Hill and Biwabik plants on the Mesabi are the first to use a permanent magnet for such service.

Evidence of the effectiveness of the above designed features is offered by the medium consumption for the 1953 season, which fell substantially below 1.0 lb per ton of feed to the section. Inasmuch as medium costs make up a substantial portion of total Heavy-Media treatment costs, the problem of reducing the consumption has received special attention in the West Hill Plant design.

Pit screening and crushing section feeds ore to the modern plant. Mine development was begun in December 1951 by Pickands, Mather & Co.

Cyclone Separation Section

During the 1953 season, the lean fines from Heavy-Media or jig ores were stockpiled for future treatment in a 2-unit cyclone separator section. This cyclone section is now under con-

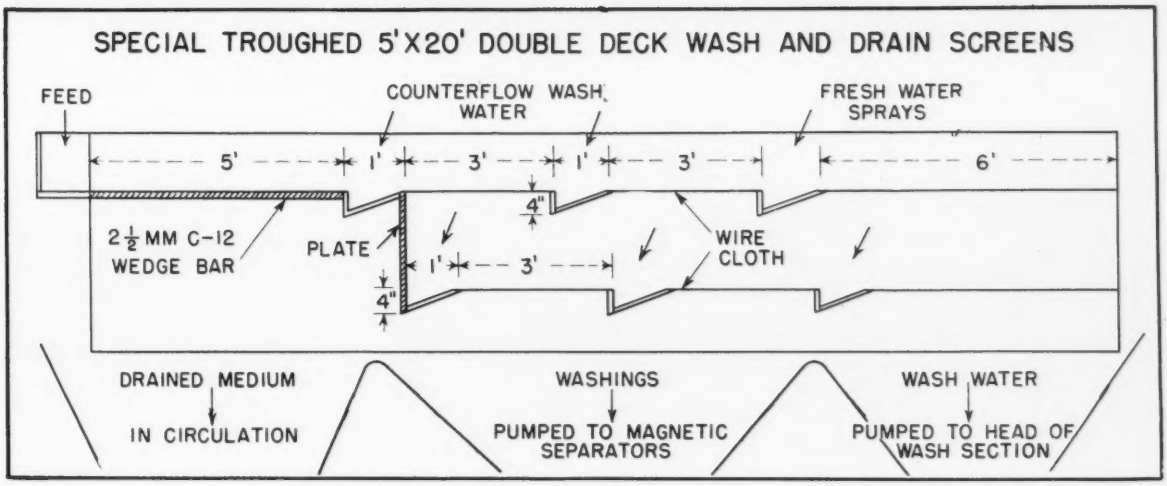


FIG. 4 Counterflow washing, an innovation on the Range, is one of the features of the West Hill plant. Use of double deck screens reduces attachment losses of medium cuts down wear on screen cloths.

struction and will be in operation early in 1954. A description of the flow scheme to be used is as follows:

If the 84-in. classifier sand product is lean and requires treatment, it is diverted to the cyclone concentrator section. Feed is conveyed to a surge pile by a boom stacker, and is reclaimed by means of a vibrating feeder under the surge pile. This feed is conveyed to a 100-ton bin at the head of the cyclone plant. From this bin the feed will be split to two identical sections, each having a capacity of 80 tons per hour.

Feed rate to each section is controlled by a 16-in. diameter roll feeder. The feeder discharge is dewatered over a 6x16-ft Hewitt-Robins Dewaterizer, this being done to minimize dilution of the medium by free water.

Tramp oversize, plus ⅝-in., is rejected at the Dewaterizer. The dewatered product falls to the cyclone feed pump sump and is mixed with circulating and fresh medium therein. A 6-in. sand pump delivers the pulp to two 14-in. dia cyclone separators which make the split into underflow or concentrate, and overflow or tailing. These cyclones are to be constructed of cast Ni-Hard, according to design, by the Staver Foundry.

Nordberg Type F screens are to be used for drain screens. The drained medium is recirculated. Some washing will be done on the screens, but initially no attempt will be made to produce a washed final product from the screen oversize. The screen undersize and washings are laundered to 60-in. and 72-in. primary electromagnet separators which produce a magnetic concentrate and a tailing. The tailing will be combined with the screen oversize product and be fed to 60-in. long secondary permanent magnet separators.

Inasmuch as one of the major problems in cyclone separation plants is the recovery of the fine medium from the relatively coarse non-magnetic iron concentrate and siliceous tailing products, much attention has been given to this problem. Where the ore products from the separation are passed through the magnetic separators and discharged as spigot products, maintenance of drum submergence is highly important to medium recovery.

When the spigot load varies widely due to ore grade fluctuations, as is the case with most Mesabi ores, the operator is faced with a continually fluctuating pulp level in the magnetic separators. To combat this problem at the West Hill plant, the secondary magnetic separators will be mounted in the tanks of the dewatering classifiers, thus insuring a constant water level. Head room is saved also.

The dewatering classifier sand products represent the concentrate and coarse tailings from the ore. The classifier overflow, sink side, will be recirculated as dilution water to the magnetic separators. The classifier overflow on the float side (common to both sections) will be discarded as tailing.

Magnetic concentrates from both primary and secondary separators join and are to be pumped to a 5x8-ft tramp screen (to remove entrapped coarse material) and then pass to a 10x30-ft Hardinge thickener. Thickened concentrate is pumped by a 6-in. Triplex Deco diaphragm pump and is split, either to the cyclone feed pump or returned to the thickener via the vertical pump and tramp screen.

New medium will be charged to the thickeners by means of a 3-in. vertical Hazleton pump.

General

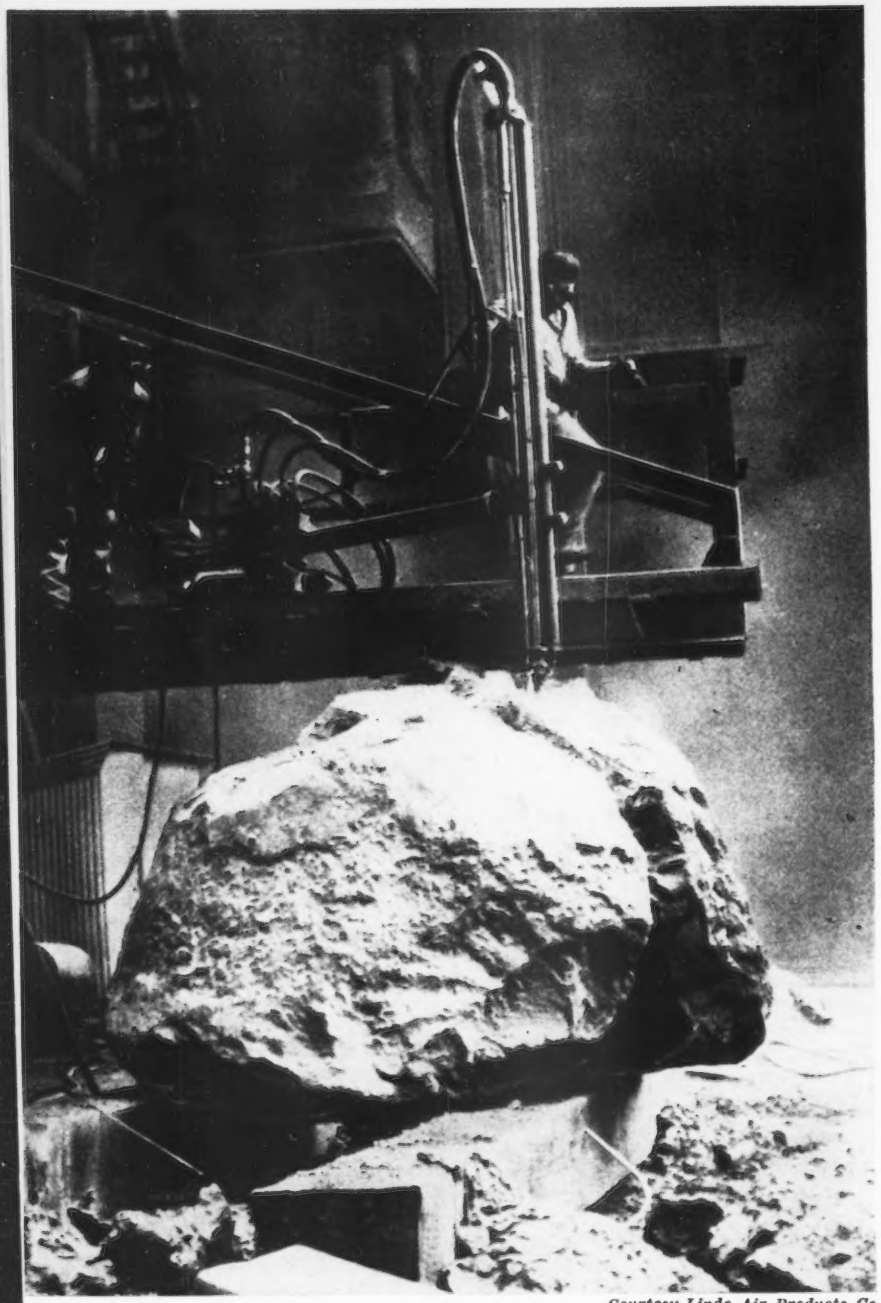
Wash concentrates and Heavy-Media plus cyclone concentrates are conveyed to separate 200-ton railroad loading bins. Coarse rejects are conveyed to a bin and trucked away. Fine tailings are pumped to the sludge basin about 3500 ft away. When no railroad cars are available, the concentrates are diverted to a bin and are trucked to stockpile. During the 1953 season the lean fines were stockpiled, and are to be reclaimed in 1954.

Water for the plant is pumped from the mine into a 50,000 gal storage tank adjacent the plant. Two Fairbanks-Morse 10-in. centrifugal pumps provide 4500 gpm of pressure water to required points in the plant.

All electrical low-voltage transformers, breakers, switch gear, and meters are located in a separate bay adjacent the washing section. Current at 440v is distributed to each section of the plant where starters and controls for the various units of equipment are located in panel boards and stop-start stations. Extensive interlocking of controls assures a minimum of trouble from power outages or possible machine failures.

During the 1953 season the grade of crude ore averaged between 40 to 45% Fe and satisfactory grades of merchantable concentrates were produced. The utilization of lean ores such as those occurring at the West Hill and other mines promises to extend the life of the Mesabi Range and benefit the country as a whole.

Metallurgical control and coordination of metallurgical and production problems are under the supervision of the Metallurgical Department of Pickands, Mather & Co.; Fred D. DeVaney is chief metallurgist, and H. G. Gerber, general plant foreman.



Courtesy Linde Air Products Co.

Mixture of iron powder and aluminum powder is used in "powder guns" to cut concrete, fire brick and slag. Also recommended is their use for reconditioning of interior surfaces of large furnaces.

Carrot shape shrinkage of riser provides comparison with result of "Hot Top" process. Cooling of cast is not as even.

Courtesy of Exomet, Inc.

Flat shrinkage of risers with aluminum in "Hot Top" mixture. Process allows higher yield, sounder casting.

The Role

G. M. BABCOCK
and
F. B. RETHWISCH
Reynolds Metals Co.

CLASSIFYING ALUMINUM AS A FUEL is not at all contrary to Webster's definition of fuel—"any matter used to produce heat or power by combustion." Aluminum is used in many reactions where its function is precisely that.

The insatiable hunger of aluminum for oxygen or its ability to "forage" oxygen from normally stable oxides are the bases of its importance as a true fuel in a number of applications. In finely powdered or granular form —and in the presence of a suitable source of oxygen—the aluminum is capable of generating intensive heat for short periods of time. It can readily reduce such oxides as iron oxide, chromium oxide, calcium oxide, magnesium oxide and carbon dioxide. This property makes aluminum extremely valuable when used as a combined fuel and reducing agent in Thermite welding and other chemical reduction processes.

A comparison of the average heat of combustion in Btu's per lb of aluminum and three common fuels is tabulated as follows:

Aluminum	13,000
Fuel Oil	19,000
Gasoline	20,750
Kerosene	19,810

Aluminum has been investigated as a solid fuel for rockets and jets. Here it is generally used in powder form, either taking its required oxygen from:

a) The air

b) A stored supply of oxygen in the liquid or gaseous state

c) Powerful oxidizing agents

These powerful oxidizing agents may be either mixed with the aluminum powder or carried in a separate container, depending on their characteristics and performances. The Btu value in such cases is not the sole measure of the efficiency of a fuel. For example; for use in rockets, jet assisted take-off (JATO) devices, and the like, the time of burning and the total Btu released from a given weight of fuel may be secondary to the need for a very high release of energy for relatively short periods of time.

Fuel density is usually an important factor in an evaluation of solid or

# of Aluminum as a Special Fuel

liquid fuels. The greatest amount of fuel by weight which can be packed in a given container becomes of vital importance.

Thus, one pound of kerosene would require about 35 cu in., while one pound of solid aluminum would occupy about 10.5 cu in.; therefore, the potential heat release for each cu in. of kerosene would be about 566 Btu and for the aluminum about 1240 Btu. If it were possible to burn this integral piece of aluminum completely, then it could prove valuable where fuel space is at a premium. Unfortunately, other factors have not made this possible to date. As in the case of any other fuel, the surface area of the aluminum in contact with the oxygen supply is a determining factor of the rate and evenness of burning. To provide fast and even burning, aluminum must be broken down to present a high percentage of surface or burning area. This is accomplished by use of flake powder or granular powder, which, because of its lighter apparent density would require a much larger storage space (in this form, 1 cu in. would produce approximately 470 Btu). Some work has been done on the burning of aluminum in the gaseous or liquid states, but no practical results have been obtained in developing this process for strictly fuel purposes.

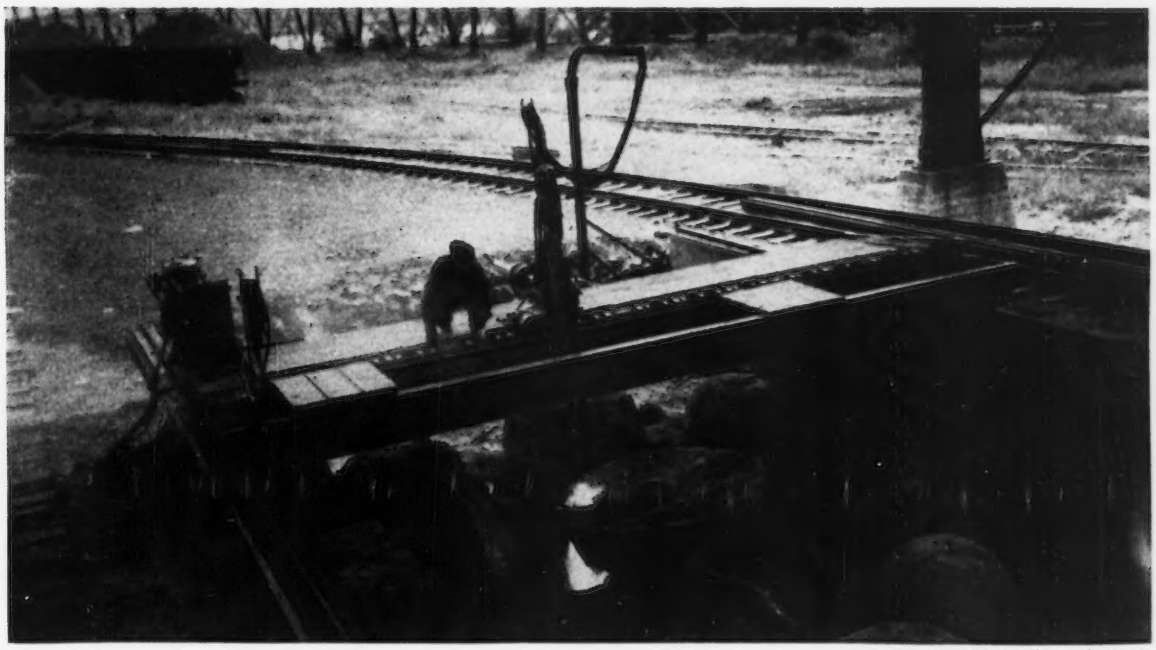
The hunger of aluminum for oxygen has been mentioned; aluminum oxide is quickly formed when the clean metal surface is exposed to air, or other gas containing oxygen. A simple experiment will illustrate how instantaneous this reaction is.

The Hunger For Oxygen

Place a small drop of mercury on a strip of aluminum. No amalgamating action will start because the aluminum is protected by a coating of aluminum oxide. Remove the mercury and abrade the aluminum by scratching through the oxide coating to fresh, clean metal. Immediately cover this freshly prepared metal surface with mercury. Again, no amalgamation will occur because of the instantaneous forming of a coating of aluminum oxide. Now leaving the drop of mercury on the aluminum use a sharp-pointed instrument to scratch the surface of the aluminum underneath the mercury. Amalgamation will now take place spectacularly since the layer of mercury protects the fresh aluminum and prevents it from combining with the oxygen in the air. This is made evident by the growth of long whiskers of aluminum oxide on the surface of the mercury. The aluminum has amalgamated, or gone in solution in the mercury and this amalgam, having a lower density than the mercury, rises to the surface where the elementary aluminum is immediately oxidized.

The formation of oxide on the surface of aluminum limits the value of aluminum as a fuel, and when the metal is reduced to powder form, the oxide content is increased. The higher the percentage of aluminum oxide, the lower is the percentage of burnable metal. The oxide coating tends to decrease the rate and evenness of the burning. The thicker the oxide coating, the higher the temperature required to initiate burning (breaking through) the oxide coating. On the other hand, the finer the particles, or the greater the surface area of the particles, the higher the temperature evolved or the faster the rate of burning.

The formation of aluminum oxide as the product of the complete combustion of aluminum offers still another difficulty in the practical application of aluminum as an "engine" fuel. Aluminum oxide (in the form of



Courtesy Linde Air Products Co.

Flame of burning aluminum is focused on furnace spills and knifes easily through the tough material. "Gun" also gives great accuracy in scarfing and the cutting of heavy scrap and preparation of slabs and billets from ingots.

corundum) has a hardness value on Moh's Scale of 9; diamond hardness on this same scale is 10. For this reason aluminum oxide is used as an abrasive in grinding wheels or even in powder or paste abrasives. It is necessary to remove the products of combustion from any engine, and where aluminum is used as a fuel, the aluminum oxide, as the product of combustion, tends to cut up and ruin the engine and its exhaust area. This condition is accentuated by the high temperature and high velocities of the reaction product. Special alloys or ceramics may be found which will eliminate or lessen this difficulty.

Powder the Best Form

Aluminum as a fuel for power or movement, therefore, appears to center around a powdered form with adequate oxygen supply to be used in engines of the hardest alloys or ceramics available and for the release of high energy for relatively short periods of time.

Many methods have been tried to utilize the quick high heat release of aluminum in powder form for welding, cutting, scarfing, etc., and several "guns" or torches have been developed for this use. The common principle in most of these is the projection of a fine granular or grain form of aluminum from a gun by air or gas under pressure. The air or gas provides the oxidizing atmosphere for the full combustion of the aluminum powder. The guns or torches may be likened to an ordinary paint spray apparatus that raises the paint by suction or by air pressure. Sand blasting equipment and domestic or commercial oil-burners are general examples of similar types of apparatus.

By the use of various types of nozzles, the flame of the burning aluminum can be focused on the work permitting exceptionally high accuracy in cutting and scarfing. These processes have found wide acceptance in industry for the cutting up of furnace "spills," for the cutting of heavy scrap for remelting, for the preparation of slabs and billets from ingots, etc. (See accompanying photo.)

In some cases, and especially when working on stainless steels, it is advisable to use a *mixture* of iron powder and aluminum powder because of the fluxing action of the by-product obtained by burning the iron. These powder cutting torches are especially indicated in the cutting of bronze, brass, nickel and other nonferrous metals and alloys. (See photo.)

These powder guns are not limited to use on metals alone, but can also be employed for the cutting of concrete, fire brick and slag. They are also indicated as an economical and efficient means for the reconditioning of furnaces.

The same general principle applies to the use of aluminum powder in "Powder Lancing."

The lance itself differs in shape and size and is designed to add to the heat of the normal gas or gases used and to concentrate this heat at the point of puncture. Materials such as concrete, fire brick and sand and metal incrustations, as well as ferrous and non-ferrous metals and their alloys are easily pierced by powder lancing methods. As an example of the efficiency and speed of these processes, a 12-in. concrete slab was pierced in one minute by using a mixture of aluminum and iron powders in a stream of oxygen.

Probably the largest use of aluminum as a fuel today is in the reduction of metallic ores or oxides to the metals themselves—this phase of use also includes the thermite process of welding.

The avid hunger of metallic aluminum for oxygen has been described, and under the correct conditions it is possible to mix finely divided aluminum with metallic oxides and then institute ignition of the aluminum. Because of the exothermic nature of the reaction, complete reduction of the metallic oxide can be accomplished (with subsequent formation of aluminum oxide) without the need of additional heat. This method is in vogue for the production of many of the metals such as molybdenum, chromium, magnesium, beryllium and calcium, to cite a few. Rather coarse powders or pellets are used to give better control to the speed of the reaction.

Thermite Welding

The reduction of metallic oxides by aluminum is also used in the thermite welding processes. A mixture of aluminum and iron oxide powders or pellets is ignited. The metallic iron resulting from the reduction of the iron oxide flows into the area to be welded or repaired, the flow of the molten iron being directed by dams and enclosures previously prepared and placed.

Because of the very high temperatures evolved in such exothermic actions, their use in thermite charges, bombs, incendiaries, flares and smoke pots has been widespread and is most common in warfare. Once this type of reaction has been started, it has been found practically impossible to extinguish. Any attempt to control or eliminate the "flame" from this reaction by use of water, carbon dioxide or carbon tetrachloride merely incites faster burning—often with explosive violence.

Another application closely related to these is the use of aluminum powder in explosives, both military and civilian. In this application, an oxidizing agent in the explosive mixture causes the aluminum to burn rapidly. The terrifically high temperature produced almost instantaneously from this reaction causes very rapid expansion of the explosive gases. This results in greater shock and so in general aluminum powders are used in explosives to increase their brisance.

Various heating devices have been designed for utilizing the heat developed (*without flame*) by the reaction of water solutions, generally of an alkaline nature, and aluminum. Typical of the method used for such is that covered by U. S. Patent 2,384,720. A weak solution of caustic reacting with granular aluminum can be used to heat canned foods, coffee, soup and the like, in emergency situations.

Better Coal Slag

Some attempts have been made to use small percentages of aluminum powders in very low grade coals, where normally successful burning is prevented by the formation of a hard, non-porous clinker which prevents access of sufficient draft. The effect of the aluminum is to form a more mobile slag which will drop through the grates into the fire box.

Finely divided aluminum is also an ingredient in many "Hot Tops," which contain materials capable of forming a thermite type of reaction. The "Hot Top" mixtures are used to blanket the surface of the molten metal when casting. The aluminum and other compounds combine in an exothermic reaction, and the heat released tends to keep the metal in the casting hot and fluid. Similar mixtures or formulations are also used in connection with the risers from castings. The differences in height of risers on castings made with and without use of a "Hot Top" mixture is appreciable, as may be seen in photographs on p 90. Use of these exothermic mixtures helps the ingot or casting to shrink with a flat shrinkage instead of the normal carrot-shaped shrinkage. This in turn allows for much higher yields, sounder castings and ingots, and better quality at lower cost.

Thus it may be seen that aluminum, as a fuel, enters into many types of exothermic reactions, whose applications are quite diversified in various fields of enterprise, and is worthy of study in its many known applications.

Survey of Mining Practice—Part 2*

Drilling and Rock-Bolting Hold Spotlight Underground

Diesel status – The two-way belt – Modern hoists – New mining methods, new surface drills, and a new method for surface blasting – Bigger shovels and trucks – Conveyor belt life increases

A. H. HUBBELL

PART 1 OF THIS SURVEY in the February *E&MJ* has already pointed out the popularity of tungsten-carbide drilling, with detachable insert bits still leading tipped steel; the spur that these detachable bits are likely to get from a new improved alloy hollow drill steel; the favor accorded air-leg drilling; the continuing wide acceptance of the single-use steel bit and the changes among the companies making it, the retention of an important place by the multi-use steel bit; the growing use of long-hole drilling, as well as of jumbos. All these combine to illustrate the complex character of current drilling practice which has been developed in the effort to deal with the many variables in the drillability of ground. Additional details are given here before passing on to other unit operations of mining practice.

Long-Hole Drilling Cuts Costs

Granby Consolidated Mining, Smelting & Power Co., in British Columbia, by a radical change in its primary breaking methods, has cut its costs per foot drilled in long-hole work by 50% and, by adopting a hole of larger diameter at the same time, has increased the tonnage broken per foot of hole from 2¾ to 4, according to J. A. C. Ross, general superintendent. This has been done by substituting rock drills, coupled rods and detachable carbide bits for diamond drills. Use of the latter has been discontinued completely. The rock drills are 3½-in. drifters that were on hand after the company had changed to air-leg drilling in development work. Tests resulted in standardizing 100% on Gardner-Denver hex alloy steel rods, including couplings, adaptors and ring-sealed shanks. Experiments with carbide bits resulted in standardizing on Timken bits and Ingersoll-Rand Carset bits in 2⅛-in. size. Tests are continuing with other bits.

Canadian Johns-Manville Co., Limited, Quebec, has changed from using diamond drills for blast holes up to 60 ft long, to drilling with air-legs and ⅞-in. sectional steel, according to J. O. Eby, mine manager. This has cut drilling costs considerably, also time required.

An Iron Mining Company, Ontario, has extended its use of long-hole drilling with coupled rods and carbide bits to economic drilling of 70-ft up-holes at any angle. This is done with the aid of a rod holder developed by drillers and made in the shop from scrap.

Anacon Lead Mines, Quebec. Douglas Parent, mine manager, finds that Coromant coupled rods and air-leg machines give lower per-foot costs than diamond drills in test holes in open stopes, and avoids difficult diamond-drill set-ups.

Beattie-Duquesne Mines Ltd., Quebec. Introduction of long-hole drilling with coupled rods, for safety in removing pillars and sublevel benches in bad ground, has been successful, also increasing tons per man-shift. Equipment used is: 3½-in. Gardner-Denver Leyner-type drill with adapted chuck and water tube, using "O" ring water sealer; ⅞-in. threaded sleeve-type rods, 3 to 6 ft long, supplied by Gardner Steel Co., Noranda, Que.; and 1½-in. Holman carbide bits. Lead shanks are home-made of ⅞-in. QO steel thread at one end and tapered to 7 deg at other end to take the bits.

Canadian Refractories, Ltd., Quebec. W. T. Bray, mine manager, using a 3-in. drifter experimentally with coupled rods and carbide bits, has not been able to beat the cost obtained with a small diamond drill making 1¼-in. holes where normal footage per shift is 250.

New Senator-Rouyn Ltd., Quebec, B. C. Nelson, chief engineer, has drilled holes to 150 ft, using a 3-in. dril, ⅞-in. hex rods, ⅛-in. O.D. couplings and 1½-in. bits installed last year. A water swivel gives the high-water pressure required.

American Zinc Co. of Tennessee. M. J. Langley, superintendent of mines, in prospecting 40-ft vertical depth of old mined areas with air-leg, 48-lb drill and coupled rods, is getting a per-ft cost $1 less than obtained with diamond drilling.

Another Tennessee company is making a slightly increased use of coupled rods in harder-than-average ore, replacing diamond drills.

Bearing witness to the trend to coupled rods in long-hole drilling, a British manufacturer, Rip Bits Limited, already mentioned, says that sales of such rods to mines are steadily increasing.

International Salt Co., in its mine at Detroit, Mich., has converted for roof-drilling purposes a Rogers Iron Works jumbo originally purchased for face drilling.

Preliminary work with an automatic Gardner-Denver jumbo installed by a Birmingham operator indicates a saving in labor of at least one man per jumbo shift.

A company in Ohio has built 2 jumbos on heavy diesel trucks using 4 hydraulic jibs having vertical and horizontal movements on each jib to position the drills.

Catavi Mine, Mining Corporation of Bolivia, has cut drilling and set-up time in half on its main mining level wth a 2-boom Joy Hydro-Jib carrying two T-400 heavy-duty drifters.

Jumbos vs. Push-Feed. At the mines in Butte, it has been found that, using the units of man-minutes per ft of hole drilled for the entire drilling cycle, push-feed drills will compete with single- or two-boom jumbos in driving drifts up to 8 by 10 ft in cross section.

Drilling on the Menominee

M. A. Hanna Co., at its mines on the Menominee Range, Michigan, is making slightly increased use of lightweight jackhammers and air-legs in development work. With them has come a greater use of single-pass steel bits smaller in diameter than the multi-use detachable steel bits formerly employed with a heavier jackhammer of the 50-lb class. A shaft is being sunk with detachable carbide bits and 50-lb jackhammers using downstroke rotation to minimize thread-wear on the bit.

Sunshine Mining Co., Kellogg, Idaho, John Edgar, general superin-

* Part 1 appeared in February issue, pp 113-117 inclusive.

tendent, is beginning to replace 3-in. drifters and stopers with 2½-in. and 2⅝-in. air-leg-type drills, using ⅞-in. hex alloy steel rods. The results are not expected for some time.

Carey Salt Co., Kansas, has substituted Joy Sulmet RD 1⅝-in. carbide bits on their Howell electric drills, in place of the steel bit used before. The carbide bit costs nine times as much but their long life more than pays the extra amount. They are drilling 36,000 ft or about 4,000 holes before being discarded. Cutting edges are touched up every 200 holes.

Comparison of Operating Results of Two Types of Drills

Type Drill	Size Hole, In.	Kind of Rock	*Average Rate Penetration Per Hour	**Average Operating Cost Per Hour	Cost Per Foot
Rotary	6¼	Limestone	40	$10.00	$0.25*
Churn Drill	6¼	Limestone	12	7.00	0.58
Rotary	6¾	Hard limestone	40	11.00	0.27
Churn Drill	6¼	Hard limestone	9	7.75	0.88
Rotary	6¾	Hard dolomite	22	12.00	0.55
Churn Drill	6¼	Hard dolomite	5	7.50	1.50
Rotary	7⅜	Shale	50	10.00	0.20
Churn Drill	9	Shale	17	7.00	0.41

*Overall operating time. **Includes labor, supplies, maintenance and depreciation.

Blast Practice Needs Wider Discussion

Compared with the extensive comment on drilling practice reported in this and the preceding installment of our Survey, that on blasting underground is meager. Use of milli-second delays, we believe, is widespread, yet few of the many operators canvassed have mentioned them. About as many more speak of igniter cord or spitter cord, followed by various companies which are experimenting with a change in kind or size of powder.

Britannia Mining & Smelting Co., in British Columbia, has been getting "very good" results by using bagged 75% Dygel with milli-second delay caps in stoping where powder blasting is used for the primary break. Development for the blasts is done 25-30 ft above the back of the stope and is so laid out as to place powder in small, well backfilled toes. The amount of powder in each toe depends on the nearness to the hanging wall, footwall or stope ends. The milli-second caps are used with delays to allow any tight ground to be relieved before breaking. Much more development is required for the initial blast, but results show less secondary breaking, less damage to installations nearby, and the stope can be controlled better than by the previous method where a heavier burden was used on the toes and blasted instantaneously. Plastic hose ¾ and 1 in. in diameter is being used in 100-ft lengths for loading deep holes.

At Mines in Butte the trend is to use of lower-strength dynamite with milli-second delays. This causes least shattering of wall rock and gives good fragmentation.

A Large Underground Nonmetal Company, in Ohio, has had encouraging results in experiments with short-period delays. At **Sigma Mines,** in Quebec, these are coming into more general use in wider stopes, and igniter cord fired by an electric connector is being used in long raises.

Hollinger Consolidated Gold Mines, in Ontario, is replacing 55% powder with 70% and, with this change, is adopting ignition cord and connectors in place of hand-trimming and spitting by crew. **Another Gold Mining Company** in Ontario has substituted igniter cord for ordinary fuse in drifts and sill drifts, primarily for reasons of safety though some fuse was saved. Preliminary experimental work in raises with igniter cord and electric starters indicated a cost reduction compared to electric blasting.

Belleterre Quebec Mines has changed over completely to C.I.L. igniter cord in drifts, raises and stoping. It has also raised the efficiency by using ⅞-in. and 1-in. powder.

American Smelting and Refining Co.'s Northwestern Mining Department, Idaho, also is increasing its use of igniters and spitter cord. **At a copper mine in the Southwest** all blasting of drift rounds and in untimbered stopes is being done with spitter cord.

"Igniticord," having a burning speed of 16-20 ft per sec, is used by an important Lake Superior iron mining company. Another operator, **Inland Steel Co.** is using igniter cord.

Other Changes in Blasting

Powder Changes. A copper company in the Southwest uses canned Nitramon powder in one section underground where excessive ground temperatures precluded safe use of Amogel powder. These cans are 2 in. in diameter and, because of rifling in drill holes, require a 2½-in. hole. This increases the cost per ft. The explosive is not recommended except for areas with ground temperatures in excess of 200 deg F.

Pend Oreille Mines & Metals Co., Washington, is loading holes with 1¼ by 12-in. semi-gelatin instead of 1⅛ by 8 in. Thermalite cord and Thermite igniters are used for spitting.

Anacon Lead Mines, Quebec. Smaller diameter powder (⅞ in. and 1 in.) is being used in places where Series 1 Coromant steel has replaced Series 4 (the smaller hole giving faster drilling) to permit use of tape fuse in the smaller hole. Powder consumption is somewhat less and use of spacers is eliminated.

A Potash Company, at Carlsbad, is experimenting with powder bigger than the ⅞-in. sticks now used and with fewer, more widely spaced holes. Results are encouraging.

An Iron Mining Company, Birmingham, Ala. is standardizing on a manufactured clay dummy in place of the formerly used dummy made from ore fines at the blasting place. Breakage is better.

Rhokana Corporation, Northern Rhodesia, has replaced "parallel ring" drilling with "split fan ring" drilling with definite improvement in blasting and stoping efficiencies. (See O. B. Bennett's paper on "Drilling Problems at Rhokana," November 1953).

Bunker Hill & Sullivan M. & C. Co., Idaho, has substituted a blasting machine with self-contained power for the costly and elaborate blasting switches heretofore used.

Breaking by Ripping and Cutting

Continuous mining machines, first introduced to the coal industry a few years ago, have gradually been making a place for themselves in non-coal mining, in particular that of potash in the Carlsbad district, New Mexico, where they are still experimental. There **International Minerals & Chemical Corp.** has been working with the Joy Continuous Miner. Enough progress has been made to encourage the feeling that respectable gains in efficiency can be made by its use in the future.

Many of the former difficulties with this machine have been eliminated.

Basic difficulties have been in adapting a machine designed for relatively easy-cutting coal to tough potash ore. It will be necessary to increase horsepower and strength of the ripping and cutting mechanisms. Further improvements will be made in ripping motors, ripping drive gear cases and in cutting bits.

Underground Loading

Machine Predominates. Loaders and scrapers, supplemented at times by conveyors, have so long dominated the loading picture underground that current comment can note for the most part only new models or new or increased use of already existing machines. For example, at Homestake in South Dakota a great increase in slusher use is called for by the change-over from shrinkage stoping to horizontal cut-and-fill with removal of some pillars. Also **Pend Oreille Mines & Metals,** in Washington, has augmented its mucking with Allis-Chalmers HD 5's front-end loaders and Eimco 104s, diesel-powered, and an **Arizona copper mine** is using 15- and 25-hp electric slushers.

A Northeastern Tennessee Company finds that a retractable hoe, developed locally, helps in getting ore in stopes that is not recoverable by scrapers.

Improvements have been made in the materials used in Joy's 18HR-2 hard-rock loader, particularly in the parts subject to abrasive wear, with excellent results in decreased maintenance. Minor changes in design have given greater continuity of operation.

In the Shaft

New Mucker Speeds Sinking. A multi-pointed, air-operated mechanical grab of 1 ton capacity, through the mucking speed it makes possible, shares in the credit for the "record" of 585 ft established last May in sinking the new 24-ft dia concrete-lined No. 2 shaft by Vlakfontein Gold Mining Co., South Africa. The points are carbide-tipped. Besides doubling mucking speed and hoisting over 100 tph, this grab required only half the number of muckers. It traverses the shaft on a radial arm riding on a monorail mounted on the lowest deck of the sinking cage. See *E&MJ*, August 1953, p 130.

The Riddell Mucker. Latest devolpments call for dual installations in a 20x14-ft shaft which is to be 4,000 ft deep. These installations will parallel the long axis. Four hoisting lines will be available. At present there are 20 active installations in various parts of the world.

Cowin & Co., Birmingham, Ala., have been sinking a 1600-ft shaft and two 850-ft shafts with their method, which calls for mucking with a clamshell handled by two tugger hoists at the collar, remote-controlled by a man in the bottom.

Eldorado Mining & Refining, Limited, Port Radium, N.W.T., Can., having struck under high-pressure water while sinking a winze to the 1800-ft level, called in Cementation Co. of South Africa which provided a grouting expert and a pump capable of pressures up to 2000 psi. Good headway is being made in reducing this flow, now at the rate of 800,000 gal per day.

For Concreting No. 2 Shaft, while sinking, Canadian Johns-Manville Co., J. O. Eby, mine manager, used aluminum sectional forms instead of steel employed before. Easier handling speeded sinking, cut cost.

Haulage and Transport Marked by Diesels and Conveyors

Trolleys, Batteries Dominate Field. Trolley and battery locomotives still have the major role in underground haulage in non-coal mining in the U. S. and Canada, with trolley haulage far in the lead, especially where distances are great, tonnage big, and prospective mine-life long. Use of diesel haulage and conveyor transport is growing slowly. Each promises to find a place of itself in the industry. The low cost of diesel operation attracts and, though the engine exhaust must be conditioned and the workings well ventilated, the number of locomotives and trucks is mounting. Likewise with the underground use of conveyors, the advantages of which are many. Inquiry has disclosed the following:

An Ontario Iron Mining Company has in operation on a small scale its first diesel locomotive, designed to handle 200-ton trains. Conditions are said to be ideal, CO tests are negative and odor is negligible.

Conveyors also are in operation underground in this mine. Belts with longitudinal cords replacing several plies of canvas are troughing and training well. Spillage has been eliminated, save for loads that are in fluid condition due to excess moisture.

Triumph Mining Co., Idaho, now has a 7½-ton diesel unit in service, supplementing its main haulage system. It is equipped for underground work.

A Large Mid-Western Mining Company has put a Mancha diesel locomotive into service hauling approximately 450 tons of ore per day 5,000 ft between two shafts. This is too far for the storage-battery locomotives on hand.

U. S. Potash Co., New Mexico, now has a 40-ton diesel-electric mine locomotive, 7 ft by 6 ft high and 48 ft long, with double trucks and 8 wheels. It was dismantled to get it down the shaft. The engine, of 550-hp, has double scrubbers.

New Park Mining Co., Utah, after finding a 4-ton diesel locomotive too light for its loads and grades, has replaced it with a 6-ton unit. Both are of Goodman make. The latter is being tested in service by the U. S. Bureau of Mines and the State of Utah for acceptance under the state safety laws. The management thinks this is the first diesel used underground in Utah, save for a few small applications in uranium mines in the southeast.

Claiming it to be the world's smallest practical diesel locomotive for mines, **Hunslet Africa (Pty.) Ltd.** has produced a unit 3 ft wide and 3 ft 8 in. high and with a length of 6½ ft which can be reduced to 4 ft 9 in. by removing the buffer beams. Maximum speed is 4½ mph.

Diesel-driven shuttle cars have obvious advantages over cars taking electric power through trailing cables, in the opinion of a Birmingham iron mining company, which makes extensive use of shuttle cars.

A 20-ton truck of the shuttle-car type, destined for the fleet at the White Pine copper mine in northern Michigan, was announced by Dart Truck Co. some months ago. It has a 275-hp diesel engine, equipped with a scrubber and develops 30 mph in either direction. It unloads by an apron conveyor in the bottom. It is 60 in. high.

Haulage and transport facilities of **Pend Oreille Mines & Metals,** in Washington, are augmented by 6.3 cu yd end-dump diesel trucks. With the loaders in use, this has decreased the drifting and raising in waste encountered on track grade. New drifts follow the ore on grades favorable for truck haulage.

Trolleys Double Up

Electric Locomotives in Tandem. To increase haulage capacity from a new orebody in International's potash mine at Carlsbad, two 20-ton Westinghouse locomotives were hooked together for separable tandem operation. The haul is 5,000 ft against an average 2½% grade plus 3,000 ft in favor on a 2% grade. By tandem hook-up, train size can be doubled without changing speed and haulage manpower. Locomotives are joined by a

rigid drawbar with heavy power and control leads running from primary to secondary locomotive.

Trolley for Special Purpose. To speed ore haulage from its winze shaft and to use existing haulage equipment, Beattie Duquesne Mines in Quebec installed a trolley locomotive to haul 1,000 tons per day in two 80-cu ft Granby cars over a 200-ft stretch between chutes and dump. Power is supplied at 250v, ac by an M.G. set, returning through bonded rails.

Battery Locomotives Make 100-ft Haulage Unit. A self-contained mainline haulage unit, over 100 ft long and 4 ft high above rail and comprising two 20-ton Jeffrey locomotives and two power cars that house 625-kw hr of storage batteries, is in service in a West Virginia coal mine. It hauls coal from mine faces 4 to 6 mi in 50-car trips to shaft.

In contrast in size is the 3½-ton locomotive, weighing 4400 lb with batteries, developed by Kersey Mfg. Co., Bluefield, W. Va. It is 45½ in. wide, 28 in. high and can be designed for tracks of various gage.

Cleaning Tracks. Inland Steel Co. has installed a track-cleaning machine to take care of spillage on underground haulageways.

A Summary by G.E.

The status of underground mine-haulage practice is summarized briefly by General Electric for *E&MJ* as follows:

"Battery locomotives are the traditional tool of the small and medium-size mines. They are also excellent for development work. They will probably lose favor to the underground diesel locomotives.

"Trolley locomotives are extensively used in well-established, mainline haulage service and some expanding mines are extending their trolley installation to accommodate more new locomotives. The trolley mine locomotive will probably enjoy an extensive market for many years to come.

"Diesel underground locomotives are making their first inroads in the U. S. metal mines. Mines planning new developments are giving them serious and favorable consideration.

"Conveyor belts are being used in some high-production, multiple-shift workings, and may show economic advantage under certain conditions."

Belt Transport Underground

Two-Way Belt Haulage with a single belt in which the return run travels parallel but opposite in direction to the outgoing run and moves on a troughing idler assembly exactly like that which carries the outgoing run, is in operation in Weirton coal mine, West Virginia (*Mining Engineering*, September 1953, pp. 905-909). It permits coal to be brought out and, at the same time, men and supplies to be taken in.

A Shuttle Belt Conveyor, on the development of which Hewitt-Robins, Inc. have long been working in answer to a demand for a conveying unit to serve the continuous mining machine, is "an extensible traversing unit" which moves forward with the working face as the mining machine advances, while the discharge unit remains in position at the entry to transfer the material mined to the panel belt or to a track system. The drive mechanisms are part of this fixed tripper discharge unit. This shuttle conveyor uses a minimum belt width of 24 in., handles up to 250 tph, and can be had in lengths up to 750 ft center to center.

Three Flights of 30-in. Conveyor are replacing electric haulage at North Range Mining Co.'s Book iron mine in Northern Michigan, in connection with a project for mining a body of lean ore that must be concentrated. Substantially lower haulage costs are anticipated, according to F. J. Haller, vice president in charge of operations.

Conveyor Transport following underground crushing is gaining popularity in Michigan Iron Country. Reasons are: Secondary breaking of chunks by air drills is practically eliminated; also faster tramming with less men is obtained where orebodies are located far from shaft.

Addition of a Second Gismo Assembly, comprising the Gismo self-loading transport, Gismo stope-drilling jumbo, and a modified AC HD-S tractor, has enabled Dale I. Hayes, of American Zinc, Lead & Smelting Co., Spokane, to mechanize stoping 100% in the Grandview mine.

Shakers in Iron Ore. According to Goodman Mfg. Co., there is still some use of shaker conveyors in the Iron Country, where the half-rounded conveyor troughing they make greatly minimizes the sticking of wet ore. In other applications outside this area the shaker is being used for moving hot and abrasive materials.

New Hoists—Better Practice

At Inco's Frood-Stobie Mine. Canada's highest-powered mine hoist, driven by a 6,000-hp dual motor, is one of the major new installations at International Nickel's mines. Serving one of the new twin shafts at Frood-Stobie mine, the semi-automatic hoist is controlled by push button at the underground loading pocket. Installed with it at Frood-Stobie's No. 8 shaft were 15-ton bottom-dump skips, being used by Inco for the first time. By reducing the distance of slow travel required in the headframe, thus shortening the time of the hoisting cycle, they increase hoisting capacity.

A New Hoist at Carlsbad. Changes in the hoisting equipment used by International Minerals & Chemical Corp. at Carlsbad, N. M. have made possible an increase of 40% in raw-ore tonnage hoisted. Skip size was increased to hold 11 tons. Power was doubled by adding the second motor. Rope speed was not increased. The hoisting cycle was held at about 75 sec from 1,000 ft depth.

The hoist is remotely-controlled from a console at the production shaft collar 200 ft away. From there the hoistman may operate manually or may put the controls into automatic operation. In this position it hoists, loads, and dumps completely automatically as long as required, with no attention from the hoistman. From his console he can select, with remote-control gates, the raw ore bin in which to dump. Intercommunication between plant, mine and hoistman is provided. Another feature is remotely-controlled, graduated braking on the hoist drum, manual or automatic.

When hoisting men, always done manually, the special control selector switch for men prohibits lowering the skip into the pocket close to the skip loaders, or overwinding the collar landing. This special man-hoisting circuit was incorporated to increase safety in handling the men.

M. A. Hanna Co., Menominee Range. In the past single-drum hoists have been used exclusively in the company's mines in the district. At a new mine plant under construction, two new double-drum hoists powered with 1000 and 2000-hp dc drives have been installed.

From Steel Skips to Aluminum. At Canadian Johns-Manville's Jeffrey mine in Quebec, the Anaconda bottom-dump type of skip, made of aluminum, is being substituted for the old Kimberly steel skip. This is improved capacity and duty cycle.

At the North Range Company's Warner iron mine, in Northern Michigan, the steel, bottom-dump, Lake Shore Jeto skip is being replaced by a duplicate of structural steel and aluminum alloy, to give about 2 tons less weight. Better rope factor and more efficient hoisting are anticipated as greater depths are reached.

Some revival of interest in the old Koepe or friction-drive hoist is evinced in certain quarters. The Koepe hoisting system is widely used in Europe.

(Continued on next page)

Ground Support—Varied Means

Rock Bolting Finds Favor. More than two years ago some 40-odd non-coal mining companies were named to us by the U.S. Bureau of Mines as users of rock-bolting for controlling ground. No doubt much of this was experimental at the time. Since then the practice has undoubtedly increased greatly. Edward Thomas, chief of the Bureau's roof-control section, plans on repeating the earlier survey soon. Last May the Bureau issued its first report on fundamental rock-bolting research.

In our own inquiries directed to important companies providing a fair cross section of the industry the results indicate wide-spread adoption of rock-bolting in the non-coal industry and a lively interest in improving this method of ground support wherever possible. Comment shows the varying application:

A Potash Company—"Started in a small way on haulageways. Appears to do the job."

Britannia M. & S. Co.—In widening main haulageway, where timber sets are in place, holes are drilled through each end of cap into rock and rock bolts are used to hold cap. Posts are then removed to gain extra clearance for ore train.

Sigma Mines—In larger openings on lower levels more general use is made of rock-bolting, with guniting for ground support.

Canadian Refractories — Successfully used in back and walls of all openings needing support.

Ray Mines—Kennecott—Program of placing 7 fans of 8-ft roof bolts in draw laterals was put into effect during 1953. Results, while not spectacular, more than paid in timber maintenance for the installation.

International Salt, Detroit—Formerly done from jumbo with electric or air rotary drill, set at 10-14 ft depths. Now by two Ingersoll-Rand R38 stopers. Costs of drilling holes and setting bolts reduced five-sixths. I-R impact wrench used to tighten nuts is faster and applies more tension than hand wrench. Torque meter used to test bolt stress.

M. A. Hanna Co., Menominee Range—Use of roof bolts and roof ties has increased considerably, resulting in neater ground support, requiring less space in all classes of workings except stopes where support is not required. . . . Steel sets are employed in a shaft being sunk. Every third set is held in place by a concrete ring while the rest of the sets are supported by bags full of concrete held in place by two specially formed steel rods. Reinforced concrete lath is used around the perimeter of the shaft. . . . Circular steel sets have been installed experimentally in some scraper drifts where ground is soft; wooden sets in similar conditions were knocked out by large pieces falling through mill holes or loosened by scraper.

Bunker Hill & Sullivan—Finding new and novel uses such as supporting caps for station work and hanging equipment such as blowers.

Belleterre-Quebec — Used successfully in flat-dipping open stopes.

Company in Ontario—Use for roof and wall support has increased sharply. Wedge-type steel bolts used.

Pamour Porcupine — Using more and more roof bolts.

Hollinger Consolidated Gold Mines —As means of ground support has increased considerably. Change is in progress to use of small timber on steel pads on individual roof bolts, in place of long timber supported by roof bolts.

Copper Company in the Southwest —Use has increased slightly in open stopes, though there is no definite pattern or spacing. Rather extensive use was made in supporting shallow blocky back over two conveyor tunnels, where they were placed according to needs of ground.

A.S. & R. Co., North Western Dept. —More uses being developed in our mines.

Mining Company, Ontario—Two types of bolts in use: (1) The ¾x5-in. bolt with expansion shell is successful in holding fractured walls in stopes, and has cut waste dilution, also appears safe. (2) 1-in. split-type bolts being used in crosscuts, drifts, stations, to observe effect in long-term support. Some back bolting in stopes to see if cut-and-fill, using rock bolts, can be used in place of square sets. These 1-in. split-type bolts, driven into 4-in. countersunk hole with 4-in. dia washer, are being installed in an ore pass to prevent slough.

U.S. Smelting, Salt Lake—Use has continued, replacing timber in increased number of drifts and raises. So far, use in stopes confined to test areas.

Company in Arizona—"Are roof-bolting in our sedimentary deposit wherever ground is suitable."

Homestake Mining — Drifts and stopes use rock-bolting with success in place of timbering.

New Park Mining Co.—Experimental work started at Mayflower mine where rock is of irregular blocky nature and fractured (formerly thought bolting would not be practical here).

Mines in Butte—Recent tests have shown versatility of expansion-type bolts compared with wedge-type. Hole depth not critical when former are used. May be removed by unscrewing bolts. Threaded portion is in hole and does not extend into working place. . . . Use of deslimed mill tailings for stope fill gives much tighter fill. Superior ground support and better ventilation have resulted in better mining conditions. Hydraulic fill with rock bolts can be substituted for square-set timber in narrow veins, provided fill is kept close to back.

Sulitjelma Mine, Norway — So-called "roof sewing" (involving use of old wire rope looped into drill holes successively in line, each loop being held in place by filling hole with grout) to support the back is described in *E&MJ*, September 1953, p 91.

Ground Support by Other Means

Backfill for Stopes. A large gold mine in Northern Ontario is hydraulically filling old open stopes and presently worked cut-and-fill stopes with suitable sand obtained by two-stage separation in 12-in. hydraulic cyclones of current tailings running 90% minus 200 mesh which the mill is producing at 4,500 tons per day, plus minus ⅝-in. material screened from sand from nearby pit. This fill is sent underground in rubber-lined pipes.

Treating Timber. The aforementioned company is also treating mine timber with cold 10% chromated zinc chloride solution, after soaking it in hot water to bring it to 200 deg F. Average retention of preservative is 0.87 lb per cu ft.

Calumet & Hecla is treating shaft timber with Wolman salts. Inland Steel, on the Cuyuna range, is treating tamarack cribbing and planks with Osmose salts for lining raises.

Steel and Concrete for Support. Inland Steel Co. is making greater use of circular steel sets to maintain scraper drifts in heavy ground. It is also using more timber treated by Osmose process. Another company finds prefabricated 6-in. channels useful as support for concrete forms. Canadian Refractories uses a concrete blower to blow concrete into forms in scraper drifts, grizzly chambers and the like.

Two Ontario companies are trying the hydraulically-powered Ruger Timberlift, a light timbering machine, in the one case for replacing sill stulls or caps, and in the other for repairing gangways in inactive regions.

Some Notes on Mining Methods

Highly mechanized mining, as done extensively in flat-lying deposits with

trackless equipment, such as crawler-mounted drill jumbos and loaders, shuttle cars and possibly undercutting machines, depending on the mineral mined, has done much to increase the productivity of men and machines. This procedure, coupled with rock bolting, is still found to be the major improvement in extraction methods underground. Borrowed from the coal industry, it was applied to mining potash, gypsum and certain other nonmetals, and then to iron ore, this calling for modifications in the equipment used. The ore mining operations of U.S. Steel's Tennessee Coal & Iron Division in Birmingham offer the outstanding application of this technique and equipment in hard abrasive iron ore. The Division's mechanization program is now completed, with many benefits won beyond the improvement made in production and costs.

A New Method at Butte

In perfecting the horizontal breast-cut and hydraulic-fill mining method in the Butte mines, the various improvements made at Butte in drilling, blasting, hydraulic filling and rock-bolting, noted elsewhere in this Survey, have been integrated. Veins that have always required timber in the past have been mined by the new method because, with careful rock-bolting and hydraulic fill introduced on each floor, the hanging wall and back have been adequately and quickly supported. There is no major delay for filling. Now ore flows steadily. Only one shift is required to prepare for and place an hydraulic fill.

A "horizontal ring shrink caving" method is replacing sublevel caving at Flin Flon, Man. for removing vertical pillars, usually 50 ft long, 250 ft high, and 40-100 ft wide, between sand-filled stopes. The new method permits good recovery with minimum dilution, greater safety, and lower development costs. It calls for developing the pillar at the bottom only and mining it upwards by blasthole drilling from a hanging wall raise. The pillar is mined completely without leaving a shell. Fill is held back only by the broken muck. Carefully controlled pulling of draw-points is required.

Conversion from open pit to underground mining at the Kiirunavaara iron mine in Sweden is under way with important new arrangements. Output is to be raised from 9-million to 15-million metric tons for year. Articles dealing with this are being prepared in Sweden for early publication.

Grouting to seal off water flows, old as the practice is, seems to be more commonly resorted to nowadays, whether because of greater familiarity with it or because there is greater need of getting out the metal. A recent instance of note is that of the grouting done by Kennecott at Nevada's Deep Ruth shaft, (*E&MJ*, November 1953, pp 94-95).

At Flin Flon, in Manitoba, grout for sealing shafts and drifts was formerly kept in suspension by hand-mixing and pumped with low-pressure pumps at 200 psi or less. A special new grout pump now permits a thicker grout to be pumped at pressures up to 700 psi to get a better seal. An air-powered mixer keeps the grout mixture in suspension.

Use of plastic pipe in drain lines where water is corrosive is reported by various companies, including Island Mountain Mines in British Columbia. The latter is also using stainless-steel pumps. A shaft-drainage line of 3-in. plastic hose is giving another British Columbia company good service where copper water is corrosive.

Automatic pumping installations, several in number, have been made by Inland Steel Co. on the Cuyuna Range. An elbow flow meter has been developed.

M. A. Hanna Co., Menominee Range—More horizontal centrifugal and deep-well centrifugal automatically-controlled mine pumps have been installed. These replace pole-type, manually-controlled pumps at a considerable saving. . . .

Use of stainless steel is steadily increasing in centrifugal pumps. Neoprene-type protective coatings have been used on pump impellers and casings as well as on exterior of piping exposed to acid mine water. . . . Six-inch pipe lined with ¼-in. abrasion-resistant rubber failed entirely with the passage of 15,000 cu yd of glacial gravel sized between plus 150 mesh and minus 1½-in. Ordinary steel pipe and abrasion-resistant Ni-Hard are now on trial.

Good Ventilation a Must

Air for Deep Workings. An innovation at Creighton mine of International Nickel Co. of Canada is the method by which a 13-ft dia concrete-lined airway was put down 600 ft to funnel fresh air to workings almost a mile below surface. It will also serve as a continuation of the mine's safety manway to surface and will carry sand-fill pipelines. To construct it, a 7 x 11-ft pilot raise was first driven in 200-ft sections. Then, working from the top down, each section was widened to the size of the airway and concreted. This work was done from a platform hung on four sets of chains from eye bolts driven into a finished "lift" of the airway wall. Sectional steel forms were lowered into place for each pour of concrete, which was piped from a mixing station on 56 level. Efficiency of the cycle owed much to these forms, which were lowered into position in a fraction of the time it would have taken to set up wooden forms.

To expedite the program at Creighton, concrete is blown through hundreds of feet of pipe from underground mixing stations directly into the forms.

Better Ventilation at Face. A big iron mining company in Birmingham holds that use of 18-in. steel ventilation tubing, as compared to the rubberized, flexible type, allows for more and better ventilation at the face. Use of "Cocoon" for leaks at overcasts has shown advantages.

An iron ore operator in northern New York is installing more propeller-type fans for ventilating stopes. A Bolivian tin company is using 30,000-40,000-cfm Joy ventilators in its block-caving areas.

M. A. Hanna Co., Menominee Range. Two new 60,000 cfm ventilation plants with heating facilities and Aerodyne fans were installed on surface for blowing air underground. . . . Successful experiments with an electronic air cleaner have led to the proposed installation of a 20,000 cfm unit underground. The advantages of being able to re-use air at mine temperature in winter is obvious.

Also Better Communications

Varied Means. Several products to improve communication in mines, in addition to their Trolleyphone, have been introduced by Farmers Engineering & Mfg. Co. They include a loud-speaking mine telephone for paging and voice communication anywhere in a mine (it may be connected with the Trolleyphone); also audiophones which provide fixed-point wired audio communication for mines and may be connected to Femco carrier systems; also the Cagephone which uses carrier current over hoist ropes.

Television offers new possibilities of keeping watch on remote operations, possibly to spot potential trouble in time to make corrections.

More Light for the Miner

Better light is welcome underground but in most places aside from main haulageways and the like the miner is supposed to carry it with him in the form of a cap lamp—an idea that is not too bad if the lamp is one of the efficient electric lamps available.

In Mexico, the American Smelting & Refining Co. is now using or preparing to use Edison electric cap lamps in 7 of its 9 producing properties. Five

of these properties will be 100% on electric lighting.

Ordinarily, only the stations, grizzlies, charging and pump stations in Belleterre Quebec's mine are lighted electrically. In one large stope, however, they are using a portable light in which an automobile sealed beam unit is lit by a small generator. And one of the largest iron ore operators in the Lake Superior region has an adaptation of the sealed-beam headlight at the working face to provide better light.

In the mine at Flin Flon compressed-air-turbine electric lighting is used for temporary scram lighting at locations where compressed air is available and where the cost of electric cable is excessive.

Other Modes of Drilling

Much space has been given to rock drilling[1], including drilling of long holes with coupled rods. Other modes of long-hole drilling remain:

Diamond Drilling. Details from R. D. Longyear's annual summary follows: Several holes exceeding 6,000 ft in depth . . . Directional drilling techniques improved. In some cases retrievable wedges used successfully . . . More emphasis on up-to-date, mobile equipment for both vertical and inclined holes, to offset high labor costs. Diesel drive more frequently used . . . Improved core barrels for best possible core recovery in difficult coring ground becoming standard . . . Use of mud for circulation increasing . . . Controversial opinions as to practical value of orientation of diamonds in bits. However they are in use in a limited way . . . In blast-hole drilling, the diamond drill is still an economical tool in long-hole work or in short-hole work in very hard ground.

Jet Piercing is regarded definitely as a method for making blast holes in breaking taconite, now that mining of this material has begun. Three machines are in operation and several others ordered for 1954 delivery. That now in use, JPM-3, has not been changed nor has the procedure appreciably. A new use for jet-piercing is called "satellite" piercing by Linde Air Products Co.—a method for producing more usable ore per foot of hole. As yet its nature is unrevealed.

Cleveland-Cliffs Iron Co. plans on jet-piercing blast holes on new low-grade jasper development. Experiments have also been run with 5½-in. percussion machine, drilling 4-in. blast holes with carbide bits.

A new cable-type drill of advanced design for blast-hole and prospecting work is being brought out by Loomis Machine Co. Among its features are: It will handle 2,000 lb of tools to 1,000 ft, 2,200 lb at normal depth, and can spool 1,000 ft of ¾-in. cable each side of divider; may be mounted on medium truck or crawlers. Controls are grouped to facilitate operation.

Drilling Performance Compared. The accompanying table, based on averages, comparing performance of rotary blast-hole drill and of churn drill has been prepared by Joy Mfg. Co.

Induction heating of 9-in. churn drill bits with automatically controlled tempering and hardening, has been proved by U. S. Steel's Oliver division at Hibbing, on the Mesabi, to give substantial annual savings compared to the oil-fired furnaces formerly used.

Heavy-duty hammer drill, Joy's TW-500, is said to be doing well drilling 4½-in. holes in hard formation to as deep as 70 ft, this after much experimentation particularly as to drill rods. These were 2 in. in diameter with a ¾-in. hole.

Hammer follows drill down hole in the case of the Stenuick drill, developed in Belgium, which is said to drill 4-in. holes at 8-10 fph. It has drilled to 140 ft depth in hard rock. Air removes the cuttings.

Quarrymaster drill of Ingersoll-Rand can now be used for rotary drilling as well as percussive drilling, as the hardness and abrasiveness of the ground may require, by substituting an air-operated and rotary head and a Hughes Tri-Cone roller bit. This "all-purpose" drill is already in service.

Surface Phosphate Mining Unique But Few Changes

Stripping and mining plans at its Florida properties are being established by International Minerals & Chemical Corp. to give every possible advantage in building impounding dams and mined-out settling areas, because of the growing importance of providing adequate settling area for plant slimes. To assist in stripping overburden and for building and reinforcing the dam beyond the dragline's reach, a 16-cu yd twin-engine scraper is in service. Bucket capacity of one drag has been increased from 16 to 18 cu yd, and a new dragline, a Bucyrus-Erie 1250 B, which will be the largest in the Florida field is being built. It will use a 26-cu yd bucket on a 235-ft boom.

Automatic and remote controls have been put in operation on the booster pumps and high-pressure water pumps used in sending the phosphate matrix when mined to the washer. The large dredge-mounted pumping units have been redesigned to offer many advantages.

Of two other Florida operators, American Agricultural Chemical Co. is thinking of using bigger pumps to transport matrix from mine to washer. The Virginia-Carolina Chemical Corp. continued to use with increasing efficiency and satisfaction its 5-mi line for pumping feed between two of its plants.

In the Tennessee field, where International also operates, the matrix mined goes to the washer by trucks instead of by pumping. A 1953 increase in the legal maximum gross truck weight to 55,580 lb has influenced the use of dual rear-axle units. The tonnage hauled by railroad to the washer also has increased gradually. The Armour Fertilizer Works in this field is using larger trucks for taking the matrix to the washer.

Restoration of land after mining is receiving attention in Florida and Tennessee. This ranges from partial leveling of overburden piles and planting cover crops and quick growing trees to developing mined-over land for improved pasture lands or making it into attractive parks and recreation centers.

Scanning the Practice in Other Open-Cut Mining

Drilling. Kennecott's Utah Copper Division has added five more mobile drilling rigs to the four in service last year. The nine rigs will do all the blast-hole drilling programmed for the mine.

In Kennecott's Nevada Mines Division, Leyner drilling has been supplemented with churn drilling in Copper Flat pit for over a year. Vertical slope holes 24 ft deep and 24-ft toe holes drilled with a Leyner-type machine (mounted with compressor and water tank on a D-8 Caterpillar tractor) in the soft porphyries, take care of about 40% of total drilling. The harder porphyries and garnet limestone materials are still drilled with churn drills.

Blasting. Slope holes in the foregoing are loaded with bag powder (65% in strength) and the toe holes with 60% 1¼ by 8-in. stick powder.

Churn-drill holes, where dry, are loaded 65% bag powder and 60% powder in 1½ by 5-in. sticks where wet.

"Alternate velocity loading," as it is called by Atlas Powder Co., which developed it, is a new blasting method available to quarry and open-cut operators which uses charges of low and of high velocity explosive in alternate holes, in conjunction with milli-second delay detonators. Tested in quarries, the method is said often to have given

[1] See Part 1, *E&MJ*, February 1953, pp 113-117 inclusive.

more breakage per lb, with better control of throw. Economy is said to derive from use of ammonium nitrate explosive. This is made to perform as low-, medium-, or high-velocity explosive by inserting an ammonia gelatin core during the manufacturing process.

Trend to Larger Loading Units

Shovels and Draglines. Several factors have brought about the trend toward larger loading and haulage units. Labor costs have steadily mounted. A shovel operator in 1943 at one pit had a base rate of pay of $1.43. Today his base rate is $3.38 an hour —137% increase in 10 years. In addition, fringe benefits add greatly to the cost. Besides the higher pay, remaining ore deposits in many areas lie under deeper overburden. More yards of stripping must be handled per ton of ore. Still further, where high-grade reserves are declining, as in the Iron Country, greater tonnages of lower-grade materials, such as taconite, must be mined per ton of finished product. Under these conditions, the use of the minimum possible direct labor is a must.

Citing these facts, Marion Power Shovel Co. points to its new 10-cu yd Model 191-M shovel, the largest ever built on two crawlers and now working in iron and copper operations. Features are: High travel speed and high maneuverability; a rugged close-coupled front end for proper dumping when loading trucks or cars on grade; large-size electric motors which match or better the cycle time of smaller machines; and high reserve factor to assure continuity of operation and lower maintenance cost per ton of material moved.

Coupled with the production of this unit was the development of new, larger haulage units.

Marion has also introduced its Model 7800 dragline which has a 35-cu yd bucket and a 220-ft boom. This, it says, is the world's largest standard production dragline. About 15% deeper overburden can be handled with it on a level stripping operation than previously, at no more cost per ton.

Inspiration Cons. Copper Co., in expanding its operations, has acquired a 5-cu yd P. & H. 1500 electric shovel, with nine 34-ton Euclid trucks (4FFD) and a DW-10 Caterpillar rubber-tired bulldozer.

A big copper company in the Southwest has put a 9-cu yd shovel into service in hard, blocky waste. Its larger power and dipper size is giving increased loading efficiencies compared with the 6- and 4½-cu yd units.

Among accessory equipment, a front-end loader that discharges over the rear, was also put into service by the same company for cleaning up accumulations of rock on narrow benches where other types of loaders cannot be turned around. It has a 1½-cu yd bucket. A small rail ballast plow, also acquired, with hydraulically controlled blades is used chiefly for filling tie cribs of temporary loading tracks with broken rock from the sides, to save hand labor.

A new combination dragline-shovel is the P. & H. Model 1855, made by Harnischfeger Corp., which has an 8-cu yd bucket. All operating motions, that is, swing, dig, hoist and propel, are driven by magnetic pull instead of mechanical friction. Cycles faster by 15% are claimed.

Eimco Corp. has a new Rocker-shovel, Model 105, for heavy-duty surface loading, which uses a new clutchless tractor or prime mover of radically new design. Previously the company mounted its high-leverage rocker-arm overhead loaders on conventional tractors for heavy-duty surface loading. The new shovel has the cab in front, and can turn readily, making a "spin turn" through a dual drive under which one track moves forward while the other reverses. It also has fingertip push-button controls instead of footclutch and shift levers. Moreover, it can make full use of its tractor's oscillating motion when loading.

A highly-mobile 2-cu yd loader has been introduced by Caterpillar Tractor Co. as their No. 6 shovel. Horsepower is 66 at drawbar. Dumping height is 10 ft 9 in. with a reach of 3 ft 5 in.

In the tractor-scraper field, International Harvester has made an agreement with Heil Co. to make two-wheel rubber-tired industrial tractors.

Trend in Transport

Large open-pit operations utilize extensively the following equipment for haulage tools, the trends in each class being as noted, according to General Electric Co.

"Large electric trolley locomotives with voltages ranging from 600 to 3000 dc. Operations already electrified are keeping this equipment in operation and extending the trolley wire to accommodate expansions. One large Arizona copper company is tending away from combination trolley-diesel to straight diesel-electric operation with standard railway-type diesel-electric locomotives. Diesel-electric locomotives of the modern standard railway type are approaching the power output of existing design straight electric locomotives. The capital investment involved in placing a new major development in operation is considerably less for diesel electric than electrifying. The cost of overhead trolley and substation equipment make this type of installation more costly on a project basis than complete dieselization but with high traffic density the electrification will give less operating cost per gross-ton-mile.

"Large off-highway trucks are making big inroads on the open-pit haulage picture because they are extremely flexible, can negotiate heavy grades on crude roads and require minimum initial investment."

To Larger Trucks. There are 42 of the 50-ton Euclid trucks (Model LLD) in operation. Utah Construction Co. has 4 at the iron mine at Cedar City, Utah. Bagdad Copper Co. and a Minnesota iron ore operator each have one. A Western contractor has the largest single fleet, teamed up with 11-cu yd Marion shovels. A fleet of 6 are engaged in coal stripping.

The torque converter and semi-automatic transmissions are becoming widely accepted in the heavy mining areas. The new Allison Torqmatic brake provides braking for safe travel where grades are severe. Over 75% of rear-dump trucks in mining now have spring-mounted axles—a transition from semi-rigid axle mounting that has taken place during the last 5 years.

Tests on Dart Truck Co.'s 60-ton truck (Model Sixty) are being completed at Bagdad Copper property, Arizona. Performance and cost data should be available soon. Additional units have been purchased for service on the Mesabi.

Bagdad also has a 50-ton Tournarocker besides the 50-ton Euclid and 60-ton Dart. For the few months the three have been working, the cost of moving ore and overburden has been greatly reduced.

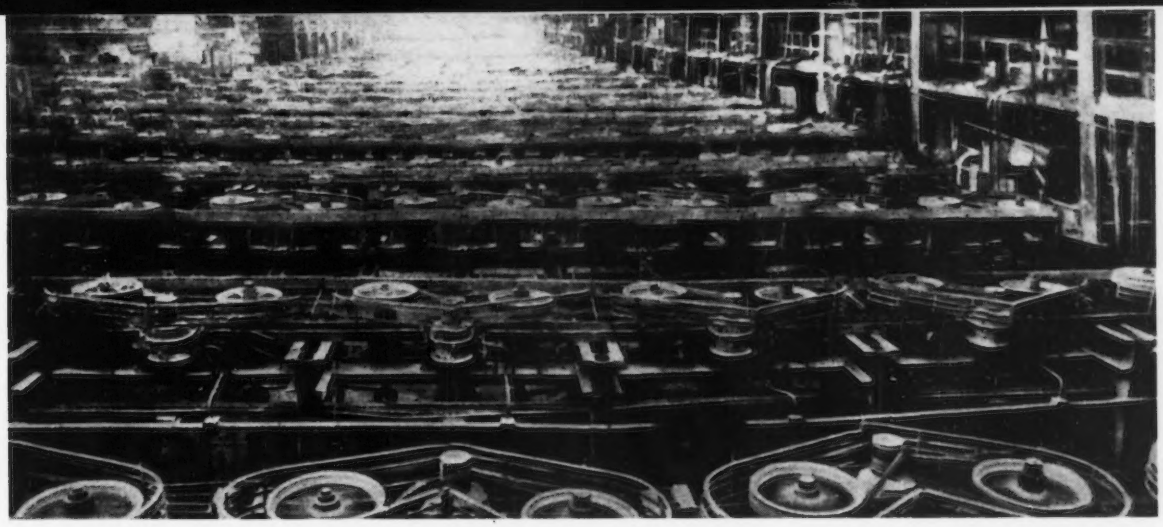
Working in iron ore is a truck consisting of a 30-ton Easton side-dumping body on a diesel-driven Dart Model 300 as chassis.

A fleet of 60-ton Kenworth tractor-trailers are hauling Marcona Mining Co.'s iron ore from mine to port of shipment on Pacific Coast in Peru.

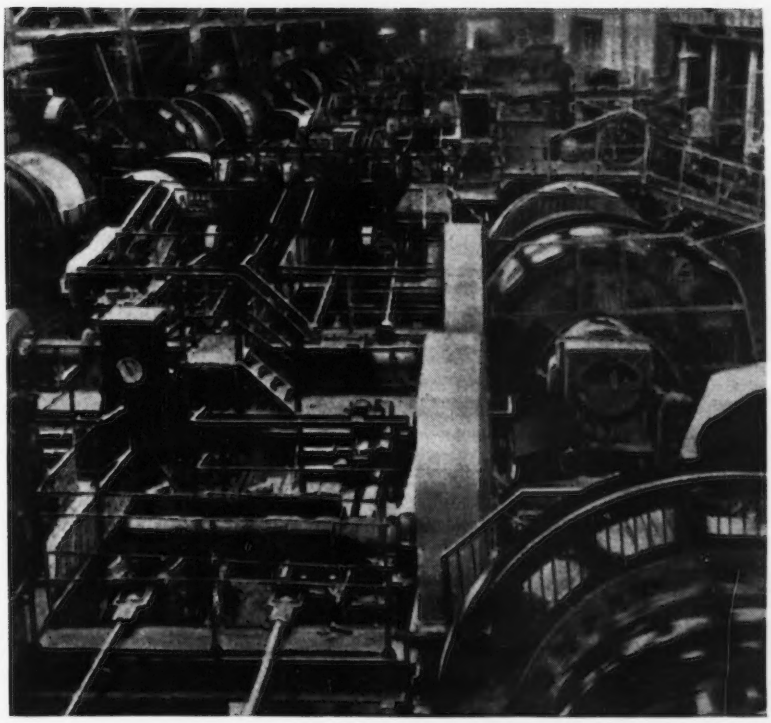
Lone Star Steel Co., Texas, has a specially built trailer of 60-70 tons capacity for carrying iron ore from mine to plant 4½ mi away. It is known as the San Angelo ore trailer.

New and larger bottom-dump trucks and larger road patrols have been installed by a diatomite company in California.

Keeps Muck from Freezing. After being tested, use of dilute magnesium chloride brine is now standard operating practice at Kennecott's Utah Copper division to keep muck from freezing to sides and bottom of the railroad cars.



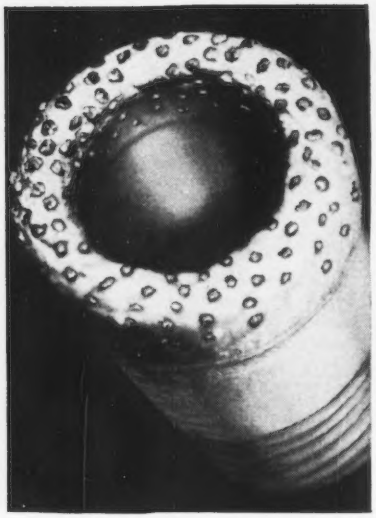
USSR Claims Full Mechanization at Mine



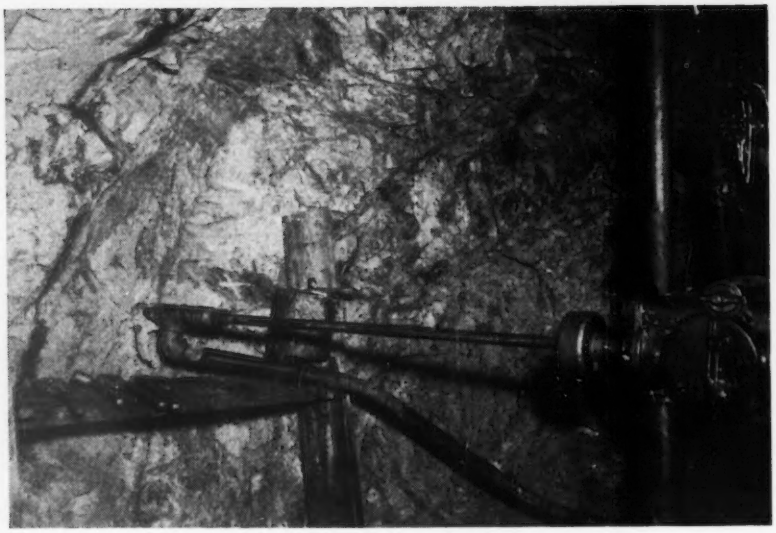
RUSSIA CLAIMS to have mechanized completely all operations at the huge Kounrad copper mine and the nearby Balkhash copper smelter. As a result, the Soviet press asserts, the Balkhash plant has increased copper output over 30% during the past two years and purity of copper shipped has been improved substantially.

The mine, near the north shore of Lake Balkhash (see map), works porphyritic deposits running about 1.1% Cu. Mechanization has made it possible to exploit the low-grade deposit. Ore from the open pit mine is loaded into 100-ton gondola cars, pulled by electric engines. At the mill, the cars are dumped and the ore transported by belts to crushers, where it is reduced to a 20-25 mm product. The ore then moves to grinding and flotation sections. Russians claim that performance of flotation machines in the Balkhash plant is "far superior to that of all other machines of the same type used elsewhere in the world."

Domestic copper is so valuable to the USSR's economy that the Balkhash and Kounrad works staff of mining engineers and metallurgists includes nine winners of the coveted Stalin prize.



An "EX" diamond core bit which has drilled 435 ft of hole.



Highly fractured nature of mine rock in which this hole is being drilled can be seen here.

Cooperation With Bit Maker Cuts Diamond Costs

A. H. LENSE[1]
Bunker Hill & Sullivan Mining & Concentrating Co.
Kellogg, Idaho

NED MILES[2]
Christensen Diamond Products Co.
Salt Lake City, Utah

SYSTEMATIC STUDY AND RECORDING of individual bit performance conducted over a period of two years at the Bunker Hill mine in Idaho, has helped achieve marked savings in diamond drilling costs. Of these, the reduction in diamond costs (almost 50%) by virtue of increased footage and salvage per bit has been judged most noteworthy.

Stated briefly, all pertinent data concerning bit performances were assembled and forwarded to the bit manufacturer, whose research and design staff was then assigned the task of developing a bit suitable to prevailing and expected drilling conditions. Naturally, a bit superior in performance to all competitors would be attempted. In our case, it was obviously accomplished.

Considering the fact that we required a single bit suitable to a formidable array of difficult drilling conditions, the bit designer's problem was no simple one. Rock characteristics (in Pre-Cambrian quartzites and argillites) varied foot by foot from argillaceous to highly siliceous, sandy to well-silicified. And more times than not, drilling was conducted in highly shattered and irregularly silicified zones, as shown in one of the accompanying illustrations. This extreme and frequent variability necessarily precluded the use of a bit tailor-made for any one type of rock. From the evidence it was concluded that matrix hardness was of primary importance. Thereupon, a sintered powdered-tungsten-carbide matrix of ultra-hardness and toughness was developed, capable of withstanding extreme abrasion and impact stress.

Further developments and testing led to the elimination of waterways, adoption of stones of larger size and indicated need for a more concentrated and adequate coverage of stones within the most vulnerable area, the inner diameter.

The drill, operated by A. G. Morgan, is a Longyear Junior. It is powered by an 11-hp air motor.

[1] Geologist in charge of diamond drilling
[2] Field representative

The diamond bit eventually adopted was a straight-wall core type, set with approximately 12 carats of West African drill borts, of a stone size of 15 per carat, in a sintered powdered-tungsten-carbide matrix, the bit having a standard "W" or full radius crown and no waterways or discharge ports.

Upon running the first bit underground it became apparent that the problems were near solution. With each succeeding bit, further refinements were adopted so that at the end of a two-year period the records showed the following diamond costs:

	1950	1951	1952
Bit cost/foot	$0.99	$0.85	$0.58
Shell cost/foot	0.21	0.10	0.09
Total Diamond Cost	$1.20	$0.95	$0.67

Respective bit performances were then itemized and due comparison with other bits showed the clear superiority of the new product.

Comparison of Bits

	Footage per Bit		
	1950	1951	1952
Soft matrix with 2nd quality stones	34	33	—
Soft matrix with 1st quality stones	—	62	—
Hard matrix (Manufacturer "A")	—	82	—
Ultra-hard matrix (Manufacturer "B")	—	110	115
Ultra-hard matrix (Manufacturer "C")	—	120	141

To date, the bit has shown the following drilling characteristics: In soft ground, more rapid polishing of diamonds resulted and the drilling rate decreased somewhat. However, this loss was of little consequence and rarely became a matter of concern. On the other hand, when drilling a hard, irregularly silicified and broken area, the bit remained sharp; the matrix was of such hardness and toughness (the ideal combination) that excellent diamond retention was maintained, and the bit operated at peak efficiency. Rarely was it necessary, because of bit failure, to pull rods in the middle of a run. Reaming, due to loss of gage, was virtually unknown and, as would be expected, shell life more than doubled. In fact, it was found that all shells, regardless of whether they were of insert or balanced type, performed well behind this bit.

Results as detailed above have clearly indicated that closely kept records, proper interpretation and complete cooperation between bit manufacturers and diamond drillers do yield dividends.

CORRECTION: In the January article, "How Cananea Gets Good Fragmentation in Large Blasts," captions under drawings showing blasting patterns (p 94) were inadvertently switched. Corrected captions are below.

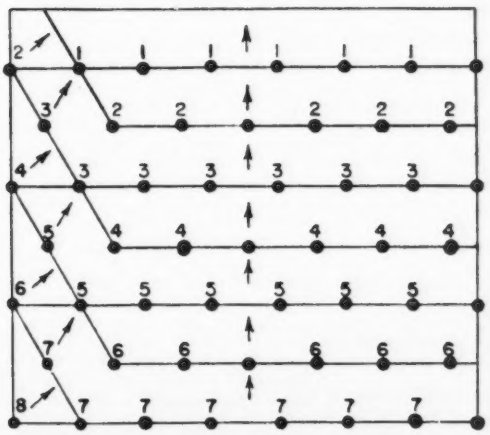


FIG. 4. Detonating pattern in previous blast gave poor fragmentation.

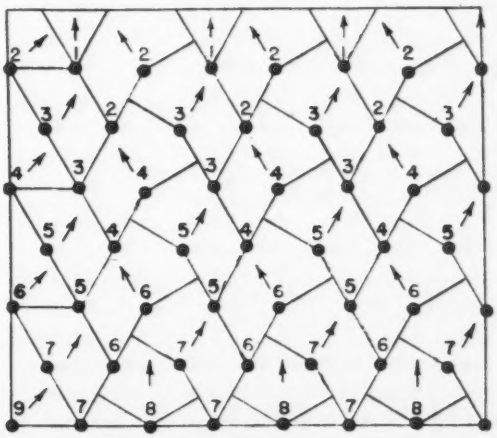


FIG. 5. "Crisscross slabbing" was responsible for good fragmentation in blast on June 21.

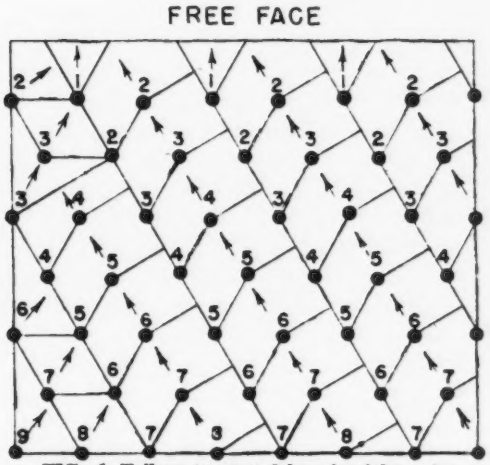


FIG. 6. Failure to start delays in right order causes loss of "crisscross slabbing" effect.

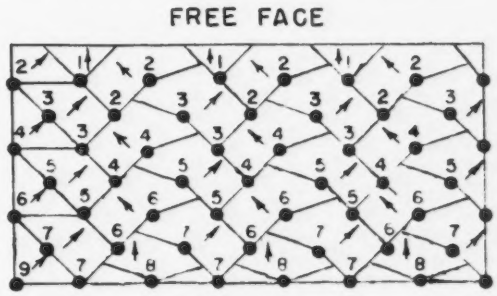


FIG. 7. Theoretically this would give best fragmentation, but is not suited for Cananea.

● DRILL HOLE WITH NUMBER OF DELAY
← DIRECTION OF ROCK MOVEMENT
— LINE OF BREAKAGE

What Chance Has . . .

Foreign Capital In Mexico?

- **What Are Regulations Regarding Mine Ownership?**
- **What Limitations Apply to Foreign Investment?**
- **May Investors Hope For A Better Break?**

CHARLES WILL WRIGHT
Consulting Engineer*

BECAUSE OF heavy investment in Mexican mining by United States citizens, the U. S. Bureau of Mines undertook to determine what conditions apply to foreign capital in Mexico.

A USBM questionnaire was submitted in 1952 through the U. S. Department of State to Mexican government mining bureaus and directors of local mining companies. Here are the questions and answers:

What are the mining code regulations regarding ownership of mineral enterprises?

In accordance with the Mexican Constitution and long standing practice, foreigners are permitted full participation in the Mexican mining industry.

What limitations apply to foreign capital participation in mining enterprises and to the export of profits and return of invested capital?

No limitations are placed on the participation of foreign capital in mining enterprises as such. The restriction as to property ownership within 100 km of the international boundary or within 50 km of the seacoast applies to all aliens, not just to those engaged in the extractive industries. Foreign legal entities and the agents of foreign governments cannot, of course, own mining concessions or become partners or shareholders in mining enterprises. Private foreign companies can be shareholders in Mexican corporations having mining concessions, provided that the Mexican corporation has waived the rights to diplomatic protection for its foreign stockholders and abides by the Mexican laws. No exchange restrictions or limitations are on the export of profits and repatriation of invested capital.

What is the Federal tax on mining concessions?

A surface tax is levied on all mining concessions according to the number of "pertenencias" (one "pertenencia" equals 2.471 acres) regardless of whether they are being worked or not. The annual tax for minerals is as follows:

1 to 5 pertenencias	6.00 pesos per pertenencia
6 to 50 pertenencias	9.00 pesos per pertenencia
51 to 100 pertenencias	12.00 pesos per pertenencia
over 100 pertenencias	15.00 pesos per pertenencia

Payable every four months.

For non-metallic minerals, coal, graphite, and placer deposits, the tax is 0.90 pesos per pertenencia.

Only 50% of the surface tax is paid during the first 5 years of a concession.

What is the production and export tax, if any, on mineral products?

The production and export taxes on the principal metals, as of the present time, are as follows:

	Production tax	Export tax	Total
Copper	5.7	17.85	23.55
Lead	8.4	17.85	26.25
Zinc	5.56	17.85	23.41
Silver	14.8	15.3	30.1
Gold	19.9		19.9

(in % of smelter returns)

These taxes vary to reflect fluctuations in metal prices and are paid based on price lists published monthly by the Secretary of Finance. For most of the other metals and minerals an ad valorem export tax of 15% is applied. The basis for calculating this tax is always the official value, except in the cases of minerals for which no official value has been set. In such cases the invoice value provides the basis.

What is the income and surtax on large and small mine operations?

For the mineral industries the income tax is the same as that applied to all industries. It is collected in addition to the production and export taxes.

In accordance with Schedule 1 of the Income Tax Law the annual tax on profits ranges from 3.8% on income over 2,000 pesos to a maximum of 35% on 1-million pesos. There is an Excess Profits Tax on that part of the profits exceeding 15% of the working capital. This tax ranges from 5% to 25% depending on the profits obtained. Working capital is represented by social capital, plus capital reserves, plus accumulated profits other than those obtained during the year. In the case of branches of foreign companies, the working capital is represented by 60% of the total assets.

The income tax law allows deductions of 5% for amortization of real estate and other immovable property investments and under special circumstances up to 10%. A depreciation of 10% on movable property investments is allowed and up to 20% under special circumstances. These deductions must be approved by the Secretariat of Finances when the Schedule 1 income tax declarations are assessed. No deduction is allowed for depletion of ore reserves as in other countries.

Are new mine developments exempted from import duty on machinery and necessary supplies?

Import licenses are required for all mining machinery and that designated for new mine projects may be exempted from import duty if application is made to proper authorities.

What are the Provincial, State, Municipal or other local taxes on mining enterprises?

The Mining Tax Law of 1933 provided that State, Territory, Municipal and Federal District government may **not** levy a tax on the following: Organization of companies, issuance or sale of securities and shares, dividends, interest, profits, production of ore and metals, purchase and sale of ore and metals by metallurgical enterprises or transfer of ownership.

By Federal Law metallurgical plants shall pay to the State Government a single annual tax of not over ½% of the assessed value of plant and installations.

* Former member of the Foreign Minerals Division, U. S. Bureau of Mines.

There is a 1% tax payable to the States on first hand sales of non-metallic products.

Other minor taxes of a general nature comprise Real Estate Taxes, Social Security Tax in some parts of the Republic and the School Tax.

Are dividends or profits subject to additional taxes?

There is a 10% tax on dividends or distributable profits payable regardless whether the profits are distributed or not.

What are the Federal controls as applied to sales of mineral products abroad and exchange rates?

Foreign exchange operations are supervised by the Central Bank of Mexico, but there is no exchange monopoly or exchange rationing. Capital profits and dividends may freely be transferred to and from Mexico. The current exchange rates are applied for the collection of taxes.

Does the Government waive certain taxes to encourage new mine production?

New mines or mines which may not have been worked for over 10 years enjoy production tax reductions from 10 to 50% for 5 years under the Mining Tax Law. Applications for exemptions must be presented and approved by the Minister of Finance.

The following production tax reductions are granted to small mines for an unlimited period of time:

75% reduction to those producing up to 50 tons a month.

50% reduction to those producing from 50 to 100 tons a month.

30% reduction to those producing from 150 to 250 tons per month.

Milling plants with a capacity of up to 10 tons per day may obtain a 75% production tax reduction for three years, and those with a capacity of from 10 to 50 tons per day obtain a 50% production tax reduction for three years.

Small Mines Taxation

The committee detailed by Sr. Loyo, Minister of Economy, to study the revision in mine taxation is interested particularly in aiding small mine owners. Decrees are now in effect which refund up to 75% of the production and export tax in inverse proportion to the amount paid monthly. If the total of these taxes amounts to 200,000 pesos or more, no refund is granted. If, however, one-half of this amount, or 100,000 pesos, is paid in a month, the refund would amount to 37½% or 37.500 pesos. The large metal producing companies will not be benefited by this proposed decree.

MR. WRIGHT

If the Mexican government would eliminate production and export taxes, it could recover this revenue through increased income taxes from a more active mining industry.

Mexico is fortunate in having thousands of small mines now worked by "gambosinas" by the most primitive methods and also many large deposits with extensive mine workings which are now idle because of the high production and export taxes. These mines are the "seed corn" of the mining industry. For their development, however, they must be supplied with mechanical equipment to bring into production orebodies that the large mining companies won't touch because they can't afford to divert their activities to small speculative ventures. Some of the large companies try to help the owners of small mines by advancing funds for payrolls, etc., against deliveries of their products, but such instances are few and the government is doing still less to help them.

The main handicap to greater activity in Mexico's vast sources of mineral supply, is the high production and export tax. The proposed reduction in favor of small mine operations will help somewhat to encourage their development, but why levy any taxes until the mines are making a profit? Available capital should go into mine developments and not into the government's treasury.

Large Low Grade Mines

To encourage capital investment in the large low-grade metal deposits, suggestions have been made to apply only the income tax as in Canada, Cuba, Peru, and certain other countries. The Minister of Economy supports this suggestion, but it is a matter for the Minister of Finance to decide. If agreed upon, it is evident that venture capital will welcome the opportunity to send engineers to investigate many of the dormant deposits of low grade copper, lead-zinc, tungsten, and other metals needed to supply the needs of industry.

An article published in the December 1945 issue of *Engineering and Mining Journal*, "Mexican Mining Must have Tax Relief" by Constantino Perez Duarte, who is now Assistant Minister of Economy, carried the following suggestions:

"As part of the program with regard to mine taxes, all those which are a burden to the industry should be studied, especially the following:

1. To repeal production taxes as they are obsolete.

2. To repeal the "aforo" or export tax because the reason for which it was established no longer exists.

3. To make a careful study of the income tax in order to make its application simple and equitable.

"Investors must enjoy reasonable protection and must be given a chance to earn profits commensurate with risks taken."

U. S. Taxes on Profits

Citizens of the United States who contemplate investing in a Mexican mining venture should not overlook the possible application of U.S. taxes to the profits of the enterprise.

Dividends paid by the enterprise will be taxable to U. S. citizens regardless of where they may reside. For this reason the U. S. investors may want to consider contributing part of the initial investment for stock and part for the companies' promissory notes. If the ratio of loans to stock is kept at a reasonable level the subsequent repayment of the loans out of profits should not be treated as a dividend and therefore should not be taxable.

The impact of Federal taxes may be felt if the Mexican company is owned by only a few U. S. citizens and it may be deemed a foreign personal holding company. In that case the U. S. stockholders will have to include in their own individual tax return their prorate shares of the undistributed adjusted net income of the Mexican corporation even though no dividends are in fact paid by the foreign corporation.

Mexico is now faced with the problem of placing the mining industry on a reasonable basis so that it may survive falling metal prices. This can be done by eliminating the production and export taxes and justly sharing in the profits of a more active mining industry by a more rigid control of the income tax payments.

(For other news of mining in Mexico, see p 176.)

WASHINGTON IMPACT

Morton A. Reichek, McGraw-Hill Washington News Bureau

Proposed Tin Agreement Stirs Capital; Intra-Government Tug-of-War Seen

WASHINGTON CONSENSUS is that the United States will not sign the International Tin Agreement. A State Department metals economist, who privately supports U. S. participation in the tin market propping scheme, succinctly explains why: "There are too many obstacles to overcome."

Obstacle number one is the lack of high-level sympathy toward the tin pact within the Administration. Professionals in the State Department and the Foreign Operations Administration, of course, are in favor. They argue that the Tin Agreement would bolster the sagging economies of such sensitive areas as Malaya and Bolivia, and would therefore be an effective weapon against the spread of Communism.

But so far this argument hasn't been heartily accepted by the Republican leadership. At this writing, there is no formal White House policy on U. S. participation in the Tin Agreement. And even the State Department has failed to adopt an "official" stand one way or the other.

Advocates of U. S. participation are seeking support for their position from Vice President Nixon and Milton Eisenhower, the President's brother and one of his top policy advisers. On their recent Presidential missions to Asia and Latin America, respectively, both Nixon and Eisenhower were subjected to considerable tin pact propaganda from government officials and tin producers in Malaya and Bolivia.

U. S. supporters of the tin pact hopefully feel the Vice President and Milton Eisenhower might be more in accord with their view because of this personal exposure to the Malayan and Bolivian situations. Nixon's and Eisenhower's feelings, however, are still unknown.

The tin pact's U. S. advocates are also hopeful that support may come from the Defense and Agriculture Departments. According to their view, the Pentagon's primary consideration is strategy, and the military should not fail to appreciate that a tin pact would put Malaya, Bolivia, Thailand, and other tin countries more solidly in the anti-Communist fold.

With U. S. experience in the International Wheat Agreement, the advocates also feel the Agriculture Department is sympathetically disposed toward international commodity agreements to stabilize markets, or at least not actively opposed.

Elsewhere in Government—particularly in the Commerce Department and in Congress—there is little or no support for our joining the Tin Agreement. The Commerce Department, for example, reflects the attitude of most U. S. tin consumers, whose principal expression so far has been negative or indifferent at best.

Most outspoken foe of the Tin Agreement has been Assistant Interior Secretary Felix Wormser. He thinks U. S. participation in the plan would be a foot in the door for this country's participation in similar treaties on other metals.

His attitude is generally shared on Capitol Hill where conservatives feel that if the U. S. signed the tin treaty we would become a party to a world cartel or, even worse, a Socialistic artifice. The traditional American antipathy toward international commodity treaties—especially on commodities not produced in the U. S. —is emphasized by many Congressional experts.

The most ardent Washington drum beaters for U. S. participation in the tin pact are the Capital's professional patrons of the tin countries; the Malayan Tin Bureau, for example. When the tin treaty issue is eventually brought out in the open, extremists among the more internationalist-minded Congressmen can also be expected to show up as proponents for U. S. participation.

When the U. S. agreed to attend last fall's U. N. Tin Conference at Geneva, at which the current treaty was drafted, it did so with the advance warning that we could not be committed to any decision that might be reached. Main reason was that the Randall Commission on Foreign Economic Policy was then at work on its mammoth report to the President, from which the Administration's World Trade Program would be spawned. Until the Commission's recommendations were made, it was then understood, U. S. decision on the tin treaty would be held up.

The Commission's report in January was quite sour on inter-government commodity agreements to stabilize markets ("Washington Impact," *E&MJ*, February 1954, p 142). The Commission said that commodity treaties "introduce rigidities and restraints that impair the elasticity of economic adjustment and the freedom of individual initiative, which are fundamental to economic progress." The Commission's conclusion: Such treaties "will not solve the problem of price stability."

Randall Report Cited

Opponents of U. S. participation in the Tin Agreement quickly seized the Randall Report as support for their view. Proponents, however, denied that the Randall Commission's objection put the kibosh on our entry into the tin stabilization scheme. They carefully pointed out that the Commission merely said there should be no "extensive resort" to international treaties as means to stabilize world commodity markets, but did not forbid such plans outright.

Best guess is that the U. S. will adopt an attitude of "benevolent neutrality" toward the tin pact while declining to sign. The question has now arisen whether the pact could make out without U. S. participation.

There's considerable difference of opinion on this point in Washington. There are those who believe the tin pact could be effective without U. S. participation, assuming that U. S. policy is benevolently neutral enough: That the U. S. would not upset the apple cart by dumping the stockpile's tin surplus on the open market. If we handle the surplus so that the Tin Agreement is not jeopardized, these officials say, the pact could be operative even without U. S. participation. It's noteworthy that these are officials who favor U. S. participation.

Other experts disagree. They argue that failure of the U. S. to join the Tin Agreement will scare off other consuming countries and destroy the tin pact's effectiveness.

New York Opinion Varied; One View Sees No Pact

NEW YORK OPINION, which may be termed the "businessman's view," turned out to be as divided on the proposed Tin Agreement as the "official" Washington opinion.

In addition to those for or against the Agreement, there was one person interviewed who didn't think that there would be any Agreement at all crystallized this year.

Generally, New York company representatives were reluctant to make any comment for publication until after completion of high-level industry-Government meetings in Washington, slated for late February and early March. The following executives give *E&MJ* their views:

Russell C. Clark, Sr., manager, Nathan Trotter & Co., commented that "There are, among others, two important considerations which make the Agreement undesirable from the point of view of both Government and consumers.

"If our government is willing to support prices of commodities produced in foreign countries, there is no question but that they will be unable to withstand demands to do the same for domestic products, particularly lead and zinc," said Clark.

"Furthermore, the new Administration is committed to a program to support free enterprise. The Randall Report (*E&MJ*, February 1954, p 142) emphasized this and came out against international agreements.

"Representatives of our government castigated the producers for gouging us —a most unfair allegation—and now, if we ratify, we will go on record as a supporter of high prices," Clark cautioned.

In conclusion, Clark said that "The law of supply and demand should be sufficient. High cost producers should not be subsidized by the American public. The difference between 75c and 95c is about $47.6-million based on our consumption of about 85,000-tons primary and secondary tin per annum."

F. Stuart Miller, vice-president of Pacific Tin Consolidated Corp., had this to say in favor of the agreement: "In view of the precarious political situation in many tin-producing countries, it is essential that some broad constructive program be undertaken to ease the downward adjustment of production now that large quantities of tin are no longer needed for strategic stockpiles.

"The proposed International Tin Agreement represents the results of six years of planning and negotiation to meet this contingency. Thus it is late to begin another new approach to the problem.

"This Agreement may not be the best possible solution, but it appears to be a solution which will hold to a minimum the disruptive effects of contraction of production in tin producing areas and, at the same time, it will assure ample supplies of tin to consumers and maintain in existence extra productive potential for any future emergency," Miller said.

John J. Jennings, metal purchase department, National Lead Co., opined that "Frankly, I don't think that you're going to see a Tin Agreement this year.

"I think it would be detrimental to the best interests of the United States to enter an Agreement which would set such a floor price," Jennings said.

"An agreement might eventually go into effect but not at the price range which the Agreement would establish. I think the tin producers could get along with a lower floor price," Jennings commented.

"It's possible," he pointed out, "that the Agreement could go into effect without United States participation but I think that if the United States votes 'No,' there will be enough other countries which would follow the United States."

Simon D. Strauss, vice president and sales manager, American Smelting & Refining Co., said that "In general we are opposed to international commodity agreements but since we are not tin producers, we don't care to make any specific comment on the proposed Tin Agreement as such."

Another New York industry executive, who preferred to remain unidentified said that he believed that the Agreement "is as good an agreement as consumers—the American public—can expect, subject to possible revision of the minimum support level."

LABOR THIS MONTH

Alan E. Adams, McGraw-Hill Washington News Bureau

MINE UNION WAR RAGES: The CIO Steelworkers Union pledges to continue the fight to win over the membership of the Mine-Mill and Smelter Workers—despite setbacks. Steel Union officials believe Mine-Mill may prevent some break-away attempts on the part of its locals but claim this will only slow down the defection movement, not stop it.

These officials reason the union cannot gain ground by winning elections where Mine-Mill leadership is being challenged; that each victory means only the union is holding its own, while each local lost to the Steelworkers moves the CIO to ultimate control of organized labor in the mining industry.

BUTTE ELECTION CRITICAL: The vote by Mine-Mill members in Butte on whether to stay in the locals or move over to the Steel Union is vital to each side. If the Mine-Mill leadership wins this test, it will slow down the CIO drive. Locals in other areas will follow the outcome in Butte and any chance for a quick Steel Union sweep will be out the window.

But this will just make both sides more determined than ever—and keep the internal mine union war raging.

CONGRESS HOT AFTER RED UNIONS: Bills are still pouring into the legislative hopper to control Communists in the union movement. The emphasis is to shift legal weapons to fight Red-led unions from the National Labor Relations Board to the Subversive Activities Control Board. Maryland's Senator Butler, who has written a Bill of his own on this score, promises to back such legislation with facts and figures on Red union leaders dug up by his task force committee in executive hearings.

He held open hearings with management and union witnesses to decide which of the myriad of measures would be most effective, but most of the union probe was carried on in secret.

NEW LEGISLATIVE ATTACK ON LEFT-WING UNIONS: While Congress decides how to prevent Communist-led unions from bargaining for the workers, Rep. Charles J. Kersten of Wisconsin comes up with a new approach. He wants the lawmakers to prohibit the government from making contracts with suppliers of defense goods whose employees are suspected of being members of such unions. Congress is anxious to take some corrective step along these lines.

NLRB CARRIES ON OWN BATTLE AGAINST REDS: The NLRB follows through against Communist-suspected unions by appealing to the Supreme Court to override lower court orders thwarting its efforts to tighten legal restrictions on Communist union leadership. The five-man panel wants the high court to legalize these procedures:

1) To permit the Board to ask suspected Red leaders to reaffirm their oaths at any time—not just once a year as the law now requires. (This is to prevent the practice of having Red officials resign from the party just for the period of oath-taking.)

2) To allow the Board to deny bargaining rights to unions whose leaders are under indictment for filing a false affidavit. (The law permits the NLRB to withdraw such rights only if an official has been convicted of lying under oath.)

RECESSION WORRIES HIT LABOR: Mine-Mill officials are bombarding members and the public with special supplements of its union paper warning that depression has already hit the non-ferrous metal industry—and figures to get worse.

The union claims employment has fallen off by 40% in lead and zinc mining, and that management is cutting back overtime operations to reduce payroll cost by nearly 25%. As a result, Mine-Mill is stressing security instead of wages in this year's bargaining talks.

THE GOVERNMENT ANTI-RECESSION PROGRAM: The Administration, playing down recession talk, still wants to be ready in case of a sharp drop in the economy. One advance program is being plugged to the hilt in the states—Unemployment Insurance. Each state is being pressured to increase its jobless benefits to about 50% of wages, up to about a $35 a week maximum; to extend payments to 26 weeks.

 (Continued from page 69)

U. S. Copper Deliveries Down for January

Deliveries of refined copper to U. S. fabricators during January declined to 77,091 tons, or 35,163 tons less than in December, according to Copper Institute. The sharp drop reflected reduced purchases as well as inventory adjustments by the fabricating division carried over from December. In January a year ago, in a seller's market, fabricators in this country obtained 125,133 tons of copper.

Stocks of refined copper in the hands of producers in the U. S. increased from 89,193 tons at the end of December to 108,121 tons at the end of January. As January 1953 ended stocks totaled 59,836 tons.

Production of crude (primary and secondary) in the U. S. was down a little during January. Output of refined copper also declined.

Deliveries outside of the U. S. increased from 86,958 tons in December to 92,277 tons in January.

A summary of Copper Institute's figures for December and January, in tons, follows:

United States

	(a) Dec. 1953	Jan. 1954
Production:		
Crude, primary	78,500	77,155
Crude, secondary	10,232	7,187
	88,732	84,342
Refined copper	123,296	111,553
Deliveries, refined	112,244	77,091
Stocks, refined	89,193	108,121

Outside United States

	(a) Dec. 1953	Jan. 1954
Production:		
Crude, primary	118,787	113,524
Crude, secondary	698	531
	119,485	114,055
Refined copper	98,527	85,436
Deliveries, refined	86,958	92,277
Stocks, refined	280,530	280,510

(a) Corrected figures.

Zinc Stocks Increase

In January, stocks of slab zinc in the hands of U. S. smelters increased 17,949 tons to 198,792 tons. Stocks on hand at the end of January 1953 totaled 88,475 tons.

A summary of the December 1953 and January 1954 statistics of the American Zinc Institute, in tons, follows:

	Dec. 1953	Jan. 1954
Stock at beginning	165,623	180,843
Production (a)	79,116	78,561
Production, daily rate (a)	2,552	2,534
Shipments:		
Domestic (a)	55,487	54,785
Export-drawback (a)	6,282	3,681
Government account	2,127	2,146
	63,896	60,612
Stock at end (a)	180,843	198,792
Unfilled orders	35,466	26,378

(a) Revised.

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipments f.o.b. New York unless otherwise stated

MISCELLANEOUS METALS

Feb. 27, 1954

Aluminum ingot, 99 plus percent, lb.	21½¢.
Antimony, spot, lb., 5 tons and up but less than carload, packed in cases	31.97¢
Bismuth, ton lots, lb.	$2.25
Cadmium, commercial sticks, delivered, lb.	$1.70
Calcium, lb., ton lots, 98 percent, cast	$2.05
Chromium, 97 percent grade, lb., contract	$1.18
Cobalt, 97 to 99 percent, per lb.	$2.60
Germanium, lb.	$295.00
Indium, troy oz.	$2.25
Lithium, lb., 98 percent	$11.00 @ $14.00
Nickel, cathodes, lb., f.o.b. Port Colborne (a)	60¢.
Magnesium, 99.8 percent, carloads, lb., producer's plant, Freeport, Texas	27¢.
Palladium, troy oz.	$22.00 @ $24.00
Platinum (Official quotation wholesale lots) troy oz.	$90.00 @ $92.00
Quicksilver, flask of 76 lbs., 25 flasks or more	$188.00 @ $190.00
Selenium, 99 plus percent, lb.	$4.25 @ $4.75
Silicon, minimum 97 percent, carloads, lb.	18½¢.
Tellurium, lb.	$1.75
Thallium, 100 lb. or more, lb.	$12.50
Titanium, 99.3 plus, lb.	$5.00

(a) Includes U. S. duty.

METALLIC ORES

Beryllium Ore, imported, 10% BeO, per unit	$46.00
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry	
44% Cr_2O_3 no ratio	$27.00 @ $32.00
48% Cr_2O_3 3 to 1 ratio	$44.00 @ $54.00
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$10.30
Mesabi bessemer	$10.05
Mesabi, non-bessemer	$9.90
Lead (Galena), 80 percent, Joplin, Mo., ton	$151.85
Manganese Ore—Per long ton unit of Mn basis 48 percent manganese, nearby positions, subject to premiums and penalties $1.02 @ $1.04 c.i.f. U. S. ports, duty extra. Long-term contract nominal at 85c. to 90c., c.i.f. duty extra.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	60¢.
Tantalite, 60% concentrate, per lb.	$2.50 @ $3.00
Tungsten Ore, per unit of WO_3	
Foreign, 60 percent, c.i.f. U. S. ports, duty extra	$16.00 @ $18.00
Domestic, scheelite, 60 percent f.o.b. mill	$63.00
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	31¢.
Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton	$50.00

(a) F.o.b. port of shipment.

METALLIC COMPOUNDS

Arsenous Oxide (arsenic trioxide) lb., in bbl. carload lots delivered	5½¢.
Cobalt Oxide, 72½% to 73½%, ceramic grade, per lb.	$1.96 @ $1.97½
Copper Sulphate, 100 lb.	$10.35
Germanium Oxide, lb.	$142.00

ALLOYS

Ferrochrome, 65 to 69 percent, per lb. of Cr contained	24¾¢.
Ferromanganese, 74–76%, net ton, seaboard	$200
Ferromolybdenum, 55 to 65 percent Mo. lb. of Mo. contained	$1.32
Ferrosilicon, 50 percent per lb. of contained Si	12.4¢.
Ferrotungsten, 75 to 80 percent, lb. of W contained	$3.80
Ferrovanadium, per lb. of V delivered	$3.00 @ $3.25
Silicomanganese, Max. 1½ percent carbon, lb. per contracts	11.4¢.
Spiegeleisen, per long ton, 19 @ 21% grade	$86.00

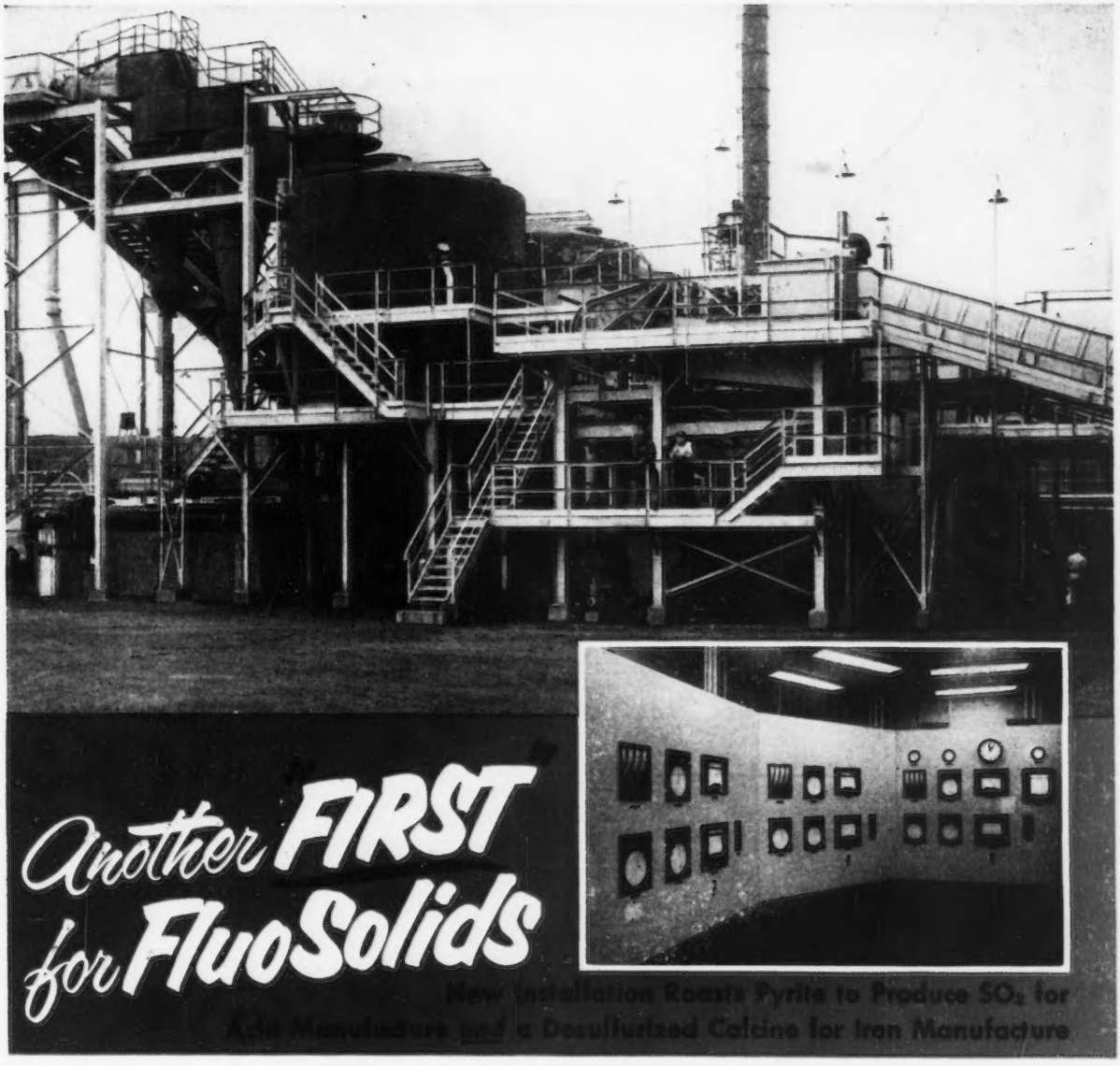
NON-METALLIC MINERALS

Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds) ton:	
Crude No. 1	$960 @ $1,500
Crude No. 2	$595 @ $900
Spinning fibers	$321 @ $514
Shingle fibers	$150 @ $200
Paper stock	$109 @ $137
Waste	$77
Shorts	$35 @ $70
Asbestos, f.o.b. Vancouver, B. C. (U. S. funds):	
Spinning fiber, 3-K	(b)$460
Shingle fiber, 4-K	$185
Asbestos, Vermont, f.o.b. Hyde Park:	
Spinning fibers	$279.50 @ $302.00
Shingle stock	$135.00 @ $162.00
Paper stock	$81.50 @ $115.00
Waste, stucco or plaster	$71.40
Refuse or Shorts	$34.00 @ $63.00
Barytes, f.o.b. cars:	
Georgia, crude, per ton	$14.00
Missouri, 94 percent $BaSO_4$, per short ton	$13.25
Bauxite, long ton, f.o.b. point of shipment:	
Domestic, crude, 50 to 52 percent (not dried)	(a) $5.00 @ $5.50
Domestic, chemical, 55 to 58 percent	(a) $8.50 @ $9.05
Domestic, abrasive, 80 to 84 percent	(a)$18.00 @ $18.50
Feldspar, bulk ton:	
Potash or soda feldspar, 200 mesh, ceramic grade	$18.50 @ $22.25
Glass feldspar, white, 20 mesh	$11.75 @ $12.50
Fluorspar, f.o.b. mines, bulk, 70% effective ton	$42.50
60% effective CaF2	$38.00
Acid 97% concentrate, bulk, ton	$57.50
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00 @ $14.00
Magnesite, per ton dead-burned, bulk, f.o.b. Washington	$38.00
Mica—Domestic, f.o.b. mines. Punch 12 to 22¢. per lb. according to size and quality. Sheet clear, 1½ x 2 inch, 70¢. to 85¢.; 2 x 2 inch, $1.10 to $1.60; 2 x 3 inch, $1.50 @ $1.60; 3 x 3 inch, $1.80 @ $1.90; 3 x 4 inch, $2.20; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet, ground, very fine, $140 @ $155 per ton. Bulk sales, dry ground: $32.50 @ $70.00 per ton Scrap $32 and up.	
Ocher, Georgia, ton, in sacks	$30.00
Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports	Not quoted
Sulphur, Texas, mines, long ton	$25.50 @ $27.50
Talc, f.o.b. works, ton:	
New York, purified	$18.50 @ $20.00
Vermont, extra white	$12.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$30.00

(a) Normal. (b) Corrected.

IRON AND STEEL

Pig Iron, gross ton, basic, Valley Furnaces	$56.00
Steel f.o.b. Pittsburgh, billets, net ton	$62.00
Structural shapes, 100 lb.	$4.10 @ $4.15



Another FIRST for FluoSolids

New Installation Roasts Pyrite to Produce SO_2 for Acid Manufacture and a Desulfurized Calcine for Iron Manufacture

The first commercial Dorrco FluoSolids System for producing both SO_2 gas and a calcine for iron manufacture went on stream last summer at a large steel plant on the East Coast. Consisting of three 18′ dia. Reactors and auxiliary equipment, this is also the first installation in the United States to go into operation with multiple units. A simple, flexible system provides for pyrite storage, pulping and holding tanks, and slurry feeding into the Reactors.

Feed contains 43 to 48% sulfur and is self-roasted at an operating temperature of 1650°F. A 13% SO_2 gas is produced which, after passing through cyclones, is scrubbed and sent to a 250 TPD contact acid plant supplying acid for the steel plant. Calcine is cooled and, together with flue dust and fine ore, is sintered and charged to the blast furnace.

This installation is the latest in a long list of new applications for fluid technique. Other "firsts" for FluoSolids include arsenopyrite gold roasting, zinc concentrate roasting, providing a sulfating roast for copper-zinc concentrates, roasting sulfides for making cooking liquor in sulfite paper mills, and limestone calcination.

If you would like more information on FluoSolids — the most significant advance in roasting technique in the last 30 years — write The Dorr Company, Stamford, Conn., or in Canada, The Dorr Company, 26 St. Clair Avenue East, Toronto 5.

*FluoSolids is a trademark of The Dorr Company, Reg. U. S. Pat. Off.

DORRCO

Better tools TODAY to meet tomorrow's demand

DORR

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.

Offices, Associated Companies or Representatives in principal cities of the world.

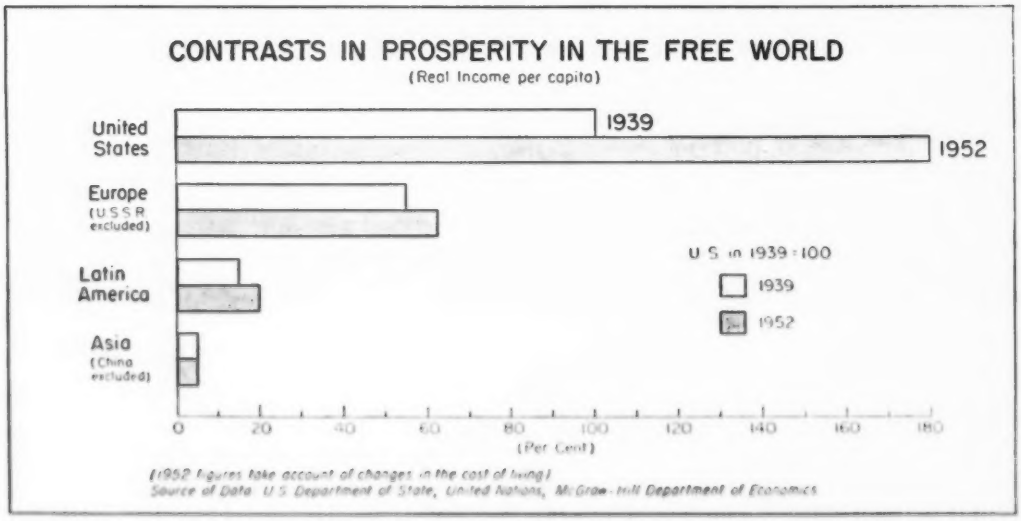
Contrasts in Prosperity Endanger the Free World

The chart in the middle of this page summarizes a situation of profound importance to every American. It shows that:

1. On the average, Americans are vastly better off economically than most other people in the free world, and
2. In recent years the gap in income between the average American and the average European, Latin American or Asian has greatly widened.

A Mounting Contrast

Even greater is the contrast between the real incomes of Asians and Americans. Today most Asians are no better off economically than they were back in 1939. On the other hand, the real income of the average American has almost doubled. As a result, the real income of the average Asian—always small by our standards—is now only a tiny fraction of that of Americans.



The chart shows that, at the outbreak of World War II, the real income (that is, actual purchasing power of income) of the average American was substantially higher than the average European's and much higher than the average Latin American's or Asian's. Since

It must be remembered that the figures used to construct the chart are of varying quality. The fact is that few of the poorer countries have reliable statistics. However, it is generally agreed among competent ob-

PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE, N. C.
• DETROIT • PITTSBURGH • BUFFALO • CHICAGO

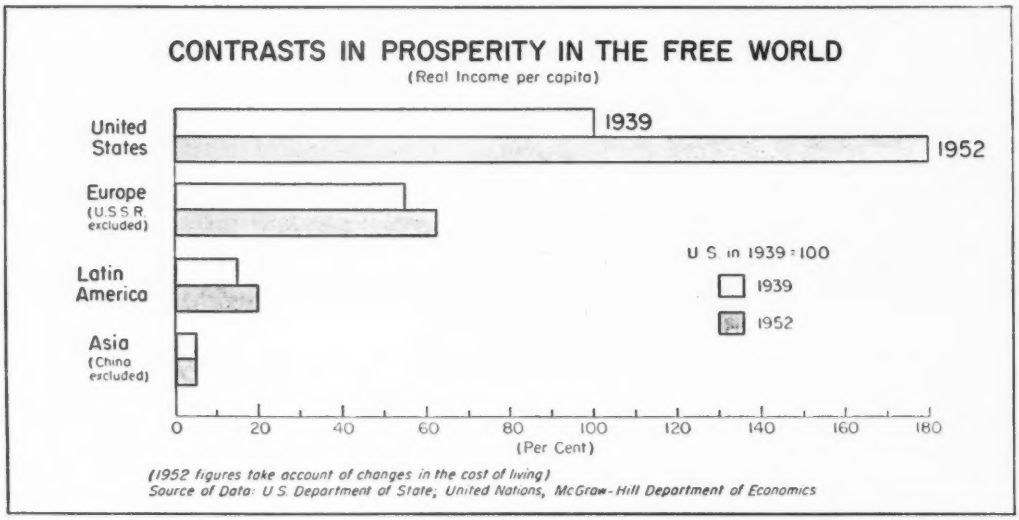
Contrasts in Prosperity Endanger the Free World

The chart in the middle of this page summarizes a situation of profound importance to every American. It shows that:

1. On the average, Americans are vastly better off economically than most other people in the free world, and
2. In recent years the gap in income between the average American and the average European, Latin American or Asian has greatly widened.

A Mounting Contrast

Even greater is the contrast between the real incomes of Asians and Americans. Today most Asians are no better off economically than they were back in 1939. On the other hand, the real income of the average American has almost doubled. As a result, the real income of the average Asian—always small by our standards—is now only a tiny fraction of that of Americans.



The chart shows that, at the outbreak of World War II, the real income (that is, actual purchasing power of income) of the average American was substantially higher than the average European's and much higher than the average Latin American's or Asian's. Since then, the European and Latin American have become better off. But the improvement in the economic lot of the average American has been so great that the others have been left far, far behind.

It must be remembered that the figures used to construct the chart are of varying quality. The fact is that few of the poorer countries have reliable statistics. However, it is generally agreed among competent observers, that the figures here presented offer a correct impression of the wide disparity in the average of real incomes between various parts of the free world. The figures, of course, have nothing decisive to say about spiritual and cultural values. In these, coun-

● Noon or midnight the loading area of this Ryerson plant looks much the same because we work 'round the clock to make sure that you get Ryerson Steel when you need it. Carbon steel, alloy steel, stainless—every kind is on hand, in practically every shape and size. Your requirements can be set down where you want them, quickly, cut to size and ready for immediate use. Just call the nearest Ryerson plant.

PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE, N. C. CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

RYERSON

tries with relatively little material prosperity may be rich.

It is possible to draw a variety of morals from the story of lagging growth of income in other parts of the world. For one thing, it reflects the dynamic force of private enterprise. Private enterprise is characteristic of our economy far more than it is of most of the other free economies. The chart also reflects the fact that we are bountifully blessed with the natural resources essential to a high level of real income. Moreover, we did not suffer from the devastation and waste of two world wars as did many of the other free nations.

Narrowing the Gap

But perhaps the most important message which the chart conveys is one of warning. It warns that something must be done to narrow the gap in prosperity between America and other parts of the free world, if that world is to be united successfully in the struggle against totalitarian Communism. Writing in the HARVARD BUSINESS REVIEW, Kenneth E. Boulding recently put it this way:

> *"The crux of the problem is how to raise the three-quarters of the world that live on a low level to the high level of the other quarter, for it is precisely this wide disparity that makes our world so unstable. American-Russian relations, for instance [are] . . . complicated almost unbearably by the fact that each power is competing for the support of the vast fringe of underdeveloped countries . . . These countries are dissatisfied with their present state and are hovering between the two cultures, wondering which offers them the best chance of shifting from their present low-level to a high-level economy."*

Very real danger threatens from any feeling which may develop in the less fortunate free nations that our enviable economic progress has been made at their expense. Instead of viewing the American economic system as a model that might be followed by their own countries, they may be led to see in it a menace to their well-being. If Communist propaganda can persuade these people that their alliance with the free world will only result in their dropping farther and farther behind an increasingly prosperous United States, they will be driven to the side of totalitarianism.

Test of Effective Leadership

How can these free nations on the lower half of the income ladder be helped to alleviate the conditions that keep them there? Surely this question poses a whole series of complicated problems. Yet, if we do not exercise some effective leadership toward their solution, we can be sure that Russia will take advantage of the situation. In these circumstances, it is essential to both the stability and security of the free world that we help our less prosperous neighbors make satisfactory headway.

This does *not* mean that the United States should sacrifice its own economic progress in favor of some sort of global leveling scheme. On the contrary, a continually expanding and stronger economy is essential if we are to provide any real aid to our friends. Also, it goes without saying that our friends must be disposed to do all they can to improve their own economic position, if our cooperation to that end is to be effective.

Great Skill Required

Our part in a program to achieve this goal calls for a high degree of skill and statecraft. It involves international trade policy, which, in itself, presents a perplexing range of problems. It involves also programs of foreign technical and economic assistance. And expanded foreign investment must play a key role in a balanced program to strengthen the economies of the free world for our common good.

The Commission on Foreign Economic Policy, headed by Clarence Randall, has recently submitted a report, embodying the results of a monumental inquiry into our foreign economic relations and measures to improve them. From the very nature of the subject, discussion of the report is bound to be attended by much controversy and conflict. However, an awareness of the facts presented by this chart should inspire us to accord to the problems posed by the Randall Commission the careful and sober consideration they must have if any real progress is to be made in raising the general standards of human well-being throughout the free world. Our willingness and ability to do this have now become the real test of our statesmanship, both at home and abroad.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C. McGraw

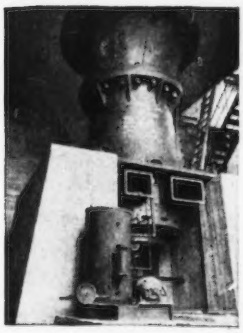
PRESIDENT

McGraw-Hill Publishing Company, Inc.

Italcementi Twin Crushing Plants for Calusco Equipped by KENNEDY...

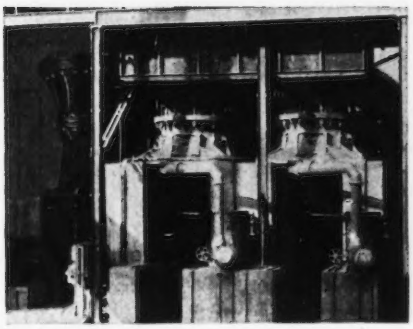
This is only one of two identical Calusco crushing plants located at separate quarries. Capacity, 2000 metric tons daily.

each producing 1200 metric tons daily of high quality, uniform cement



Primary gyratory crushers installed at both Calusco crushing plants.

Secondary crushers installed at both Calusco crushing plants.



KVS engineers handled this job from plant layout and flow charts to the designing, building and installing of all major machinery and equipment.

Two of the best equipped cement plants in the world, the twin CALUSCO plants were designed to deliver sufficient crushed and sized limestone for an ultimate capacity of 2000 metric tons per day of Portland cement clinker.

KVS machinery was selected in preference to all other makes of cement equipment as best suited to do the work required. Operating records show that the estimated capacity is being exceeded, maintenance costs held to a minimum and quality standards of cement above required minimum.

Look to Kennedy, ***first***, for the best in cement, crushing and mining machinery. Over a half-century of engineering leadership is at your disposal!

WORLD FAMOUS KENNEDY MACHINERY AND EQUIPMENT

- Double discharge gyratory crushers
- Swing Jaw Crushers
- Slugger Rolls
- Rotary Kilns
- Coolers—Dryers
- Classifiers
- Hydrators
- Air Swept Tube Mills
- Rod or Ball Mills
- Vibrating Screens
- Rock Feeders
- Pre Heaters . . . Deheaters
- Pulverized Coal Firing Systems
- Pneumatic Transport Systems

SEND FOR LITERATURE DESCRIBING KVS MACHINERY AND EQUIPMENT

IT COSTS LESS.. TO OWN THE BEST!

KENNEDY-VAN SAUN

MANUFACTURING & ENGINEERING CORPORATION

TWO PARK AVENUE, NEW YORK

FACTORY DANVILLE, PA.

PERSONAL NEWS

CHARLES D. MICHAELSON, general manager of Braden Copper Co. in Chile, has been appointed a vice president of the company. In that capacity, Mr. Michaelson will be the chief executive of Braden in Chile, with offices in Santiago.

Thomas Brennan Nolan, assistant director of USGS, received the K.C. Li medal "for meritorious achievement in advancing the science of tungsten" from **Felix E. Wormser,** assistant Secretary of the Interior. **Dr. John A. Krout,** vice president and provost of Columbia University, delivered the presentation address on behalf of the university.

D. A. Rhoades, Kaiser Aluminum & Chemical Corp., Oakland, Calif., was re-elected president of the Aluminum Association. **Arthur V. Davis,** of Aluminum Company of America, was re-elected chairman of the board and **Donald M. White** reappointed secretary-treasurer.

Clyde N. Garman went to Hillsboro, N.M., in September to assist in the construction of a 30 tph HMS and jig plant, which Haile Mines is erecting to concentrate manganese ore from the old silver mines at Lake Valley. Mr. Garman will become mill superintendent for the new plant.

Donald J. Leehey has been appointed manager of the AEC's Santa Fe operations office.

Franklin H. Bivins, of Bronxville, N.Y., has been named general manager of the newly-created Vitro Rare Metals Co., division of Vitro Corporation of America.

Dr. J. B. Tyrrell, 95, Canada's oldest living engineer and president of Kirkland Lake Mining Co., was awarded the coveted Engineer's Medal at the annual meeting of the Association of Professional Engineers of Ontario.

Brinton C. Brown, formerly with Soriano y Cia., in the Philippines, is now operating a manganese property in southern Arizona.

Ralph Dunkle, former partner in the Fisher Leasing Co., Kellogg, Idaho, is now mining engineer at Idarado Mining Co., at Ouray, Colo.

N. W. Judd has liquidated his drilling contracting business, which operated out of Shullsburg, Wis., and assumed the duties of general works superintendent at Ontonagon, Mich., for White Pine Copper Co., on Oct. 1.

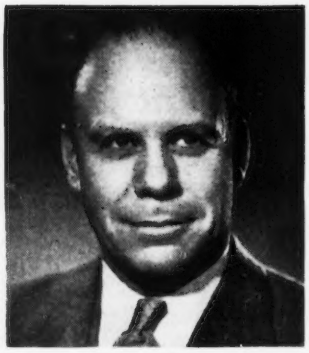
William A. Markert, chief chemist for the M. A. Hanna Co. in the Iron River district, retired Jan. 1, ending 30 years with the company and 50 years in iron ore chemical work.

Charles C. Keeton, district cashier in Gogebic for Pickands, Mather, has retired after more than 43 years with the firm.

Frank R. Milliken, vice president of Kennecott Copper Corp., has been named chairman of the program committee for the 1954 Metal and Nonmetallic Convention of the American Mining Congress, to be held in San Francisco, Calif., in mid-September.

Albino Cigallio, assistant mining captain at the Malms-Anvil mine at Ironwood, has been promoted to captain at the Sunday Lake mine, Wakefield.

L. R. Brown, Jr. is serving as section mine foreman at the Morococha (Peru) property of Cerro de Pasco.



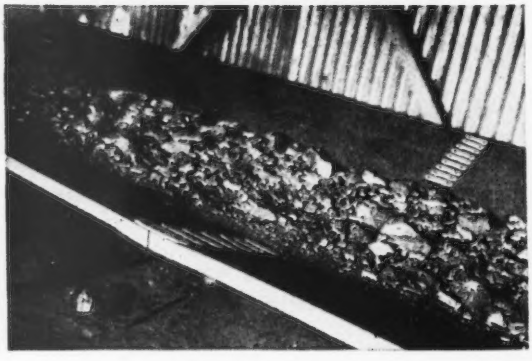
ALLEN D. CHRISTENSEN was elected president of Utah Construction Co., Salt Lake City. Mr. Christensen, former president and general manager of Marcona Mining Co., Peru, a Utah Construction subsidiary, succeeds Lester S. Corey.

George Vranesh, formerly with Idarado Mining Co. at Ouray, Colo., is now engaged as co-owner and operator of the Evening Star Uranium Mining Co., near Slick Rock, Colo.

Lloyd A. Thomas, geologist, is with Magma Copper Co., Superior, Ariz.

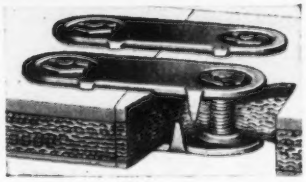
FLEXCO®

BELT FASTENERS and RIP PLATES



FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

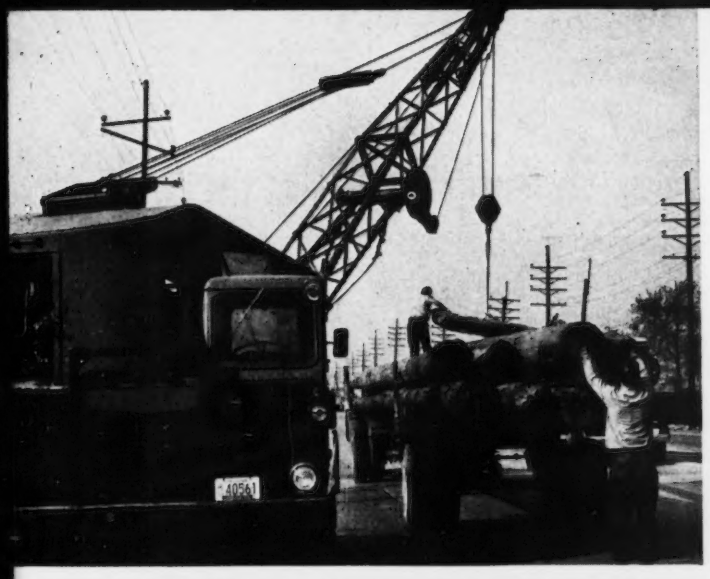
★ FLEXCO Fasteners make tight butt joints of great strength and durability.
★ Trough naturally, operate smoothly through take-up pulleys.
★ Distribute pull or tension uniformly.
★ Made of Steel, Monel, Stainless, Everdur. Also Promal top plates.
★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.

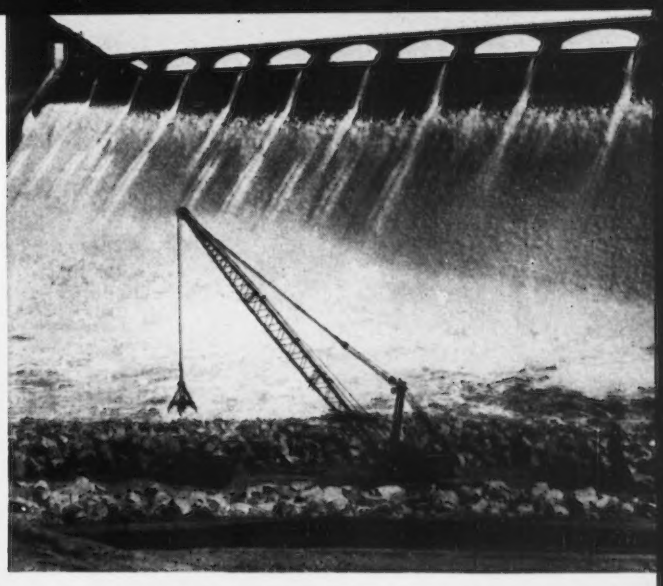


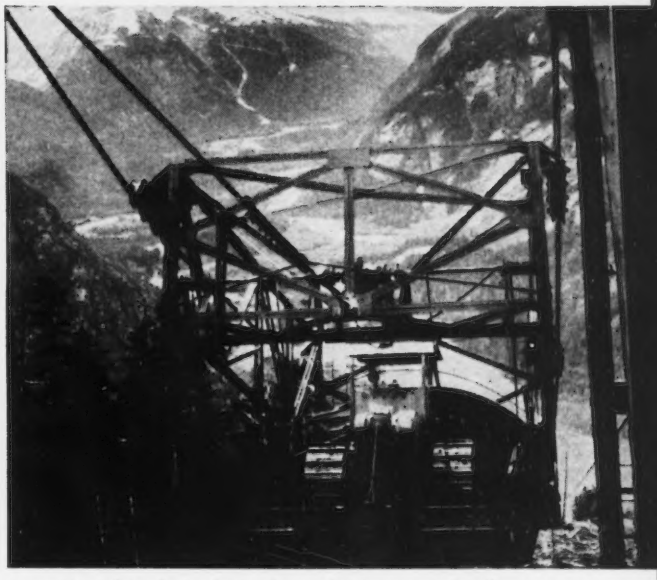
Compression Grip distributes strain over whole plate area

Order From Your Supply House. Ask for Bulletin F-100

FLEXIBLE STEEL LACING CO., 4635 Lexington St., Chicago 44, Ill.



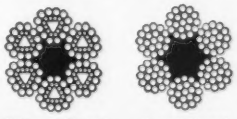




PROVING EXTRAORDINARY SERVICE—A Hercules Flattened Strand crane rope delivered 18 months service, compared to 6 months for ordinary rope. It performed equally well as a clamshell bucket rope. On a hot ladle crane it outlasted round strand rope by 4 to 1, and still tested at higher-than-rated strength. It was chosen for its super strength to haul the car on the continent's largest cableway at Kitimat.

Can Flattened Strand solve your special wire rope problem?

Hercules Flattened Strand is a special kind of wire rope that provides extraordinary service on special kinds of jobs.



Flattened Strand Round Strand

The key to the difference is the triangular shape of the strands. Notice how the strands support each other; how the rope circumference is almost perfectly round; and how the core is smaller. There is 10% more steel in Hercules Flattened Strand than in round strand ropes of the same diameter. That means *10% more strength* and *10% greater safety.* Flattened Strand wears longer and more evenly . . . and is easier on sheaves and equipment.

If you can use this Super-rope, you'll soon begin saving time, labor, money. Why not investigate?

Because Leschen pioneered and perfected Hercules Flattened Strand wire rope, Leschen is your best source of additional information. Ask your Leschen man, or write for "The Flattened Strand Story."

LESCHEN WIRE ROPE DIVISION
The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)
St. Louis 12, Missouri

LESCHEN
HERCULES Red-Strand
WIRE ROPE

OTTO HERRES, vice president, Combined Metals Reduction Co., was elected first vice president of the Utah Mining Association for the year 1954.

Albert R. Morton, assistant secretary of Oliver Iron Mining division, retired Oct. 31 after having been employed by the company for more than 35 years. He is succeeded by **Howard Clark,** Duluth, who joined the firm in 1943 as an attorney.

Henry H. Wade has become director of the Mines Experiment Station, University of Minnesota. He succeeds **Dr. E. W. Davis.**

C. J. Calvin, Hibbing vice-president of the Arthur Iron Mining Co., retired on Jan. 1, 1954. At that time he had completed 35 years of service with the Great Northern Iron Ore Properties, having started in 1919 as assistant engineer. **Clifford McIntosh,** chief engineer, has been elected vice-president to succeed Mr. Calvin and will also continue as chief engineer.

William W. Watson has been appointed an assistant chief engineer in charge of the research department; and **William A. Robins** continues as assistant chief engineer in charge of the mining inspection department. The announcements were made by

LEWIS L. HUELSDONK, general manager of Best Mines, Inc., Downieville, Calif., has been named to the California State Mining Board, to succeed William Wallace Mein, Jr., Calaveras Cement Co.

Philip L. Ray, president of Great Northern Iron Ore properties.

Eiler L. Henrickson, assistant professor of geology at Carleton College, Michigan, has received a $2200 grant for geological research from the Louis W. and Maud Hill Family Foundation. He will study the metamorphism of the Upper Huronian rocks.

W. F. Shinners, district superintendent of the Iron Mountain mine at Iron Mt., Missouri, has been appointed general superintendent in charge of the M. A. Hanna Co. Michigan mines. Mr. Shinners is succeeded by **Floyd H. Lee.**

Earl G. Richards, John T. Keane and **John W. Johnson,** all of California, have set out for the Gran Sabana, mineral-rich region in the state of Bolivar, Venezuela, to look for gold and uranium.

Dr. Edwin T. Hodge, Portland, Ore., has returned from his second tour of investigation in South Africa, Southwest Africa and Angola for Bethlehem Steel Co.

John A. Brandon, now located at the AS&R Co. Page mine, at Page, Idaho, was promoted to shift boss early in November.

George C. Zeller has been appointed director of the newly-formed Lake Superior Public Relations district of U. S. Steel Corp., in Duluth. Mr. Zeller is succeeded as assistant director of public relations of the Northwest district by **Alfred W. Wilson.**

Dr. H. R. Hanley, professor emeritus of metallurgical engineering at the University of Missouri, is in Taiwan, Formosa, to organize a department of non-ferrous metallurgy at the University there.

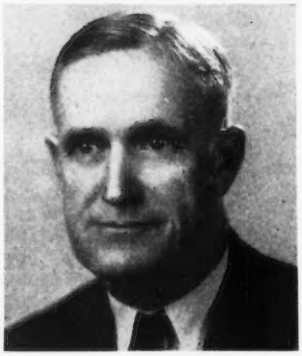
J. Q. A. Price has been elected president of Elkhorn Mining Co., Boulder, Mont., succeeding **Wade V. Lewis,** and **Floyd L. Lewis** has been elected secretary-treasurer, succeeding **J. T. Lewis.**

Western Montana Mine Owners and Operators Assn., at its annual meeting in Missoula, reelected **Earl F. Elstone** president and **A. J. Mosby** executive secretary: **John B. White, Jr.,** was elected vice president.

Walter F. Meckel, former mill superintendent at Potosi, Bolivia, for the Hochschild enterprises, is now in charge of the Paragsha lead-zinc-copper flotation plant as superintendent for Cerro de Pasco Corp., in Peru.

Frederick D. Wright, research mining engineer, USBM, has left the Bureau on a six months leave of absence for Durango, Mexico, where he will have charge of the operations at the San Martin mine, near Sombrerete.

Columbia Section of American Institute of Mining & Metallurgical Engineers, elected **L. M. Kinney,** Metaline Falls, its chairman for 1954 at a meeting in Spokane, Wash. Mr.



L. F. PETT, newly-elected second vice president of the Utah Mining Association, is general manager, Utah Copper Div., of Kennecott. Other officers of the organization include A. G. Mackenzie, vice president and consultant; Miles P. Romney, secretary-manager, and Walter M. Horne, assistant secretary-manager..

Kinney is general superintendent of Pend Oreille Mines & Metals Co., and will succeed **J. C. Kieffer** of Wallace, Idaho. Other officers chosen were: **Norman J. Sather,** Wallace, vice-chairman, Coeur d'Alene subsection; **Sherman M. Barton,** Boise, vice-chairman, Snake River subsection; **F. R. Morral,** Spokane, secretary-treasurer; **Malcolm C. Brown,** Kellogg, assistant secretary-treasurer, Coeur d'Alene subsection, and **Harry W. Marsh,** Boise, assistant secretary, Snake River subsection.

S. J. Hariss has been appointed engineering assistant to the chief design engineer, Australian Aluminum Production Commission, Bell Bay, Tasmania.

Dr. R. W. Pickering has succeeded A. S. Gill as superintendent of research, Electrolytic Zinc Co. of Australasia, Ltd., Risdon, Tasmania.

The Chilean Institute of Mining Engineers awarded its gold medal to **Horace R. Graham,** president of Anglo-Lautaro Nitrate Co., at its annual convention, held recently in the city of Conception, for long and distinguished services rendered to the copper and nitrates industries.

Howard T. Caddy, consulting mining engineer of Virginia, has added a concentration tests laboratory to his facilities. He is now equipped to offer complete mining engineering service for a property, covering exploration, development and operation.

Merlyn Woodle, Hibbing, superintendent of Minnesota mines for Republic Steel Corporation, has returned from a six months stay in Liberia, Africa, with the Liberia Mining Co. Mr. Woodle has succeeded the late **J. H. Hocking** as superintendent of Minnesota mines for Republic Steel Corp.

(*Continued on page 112*)

THE NEW CATERPILLAR D8 TRACTOR

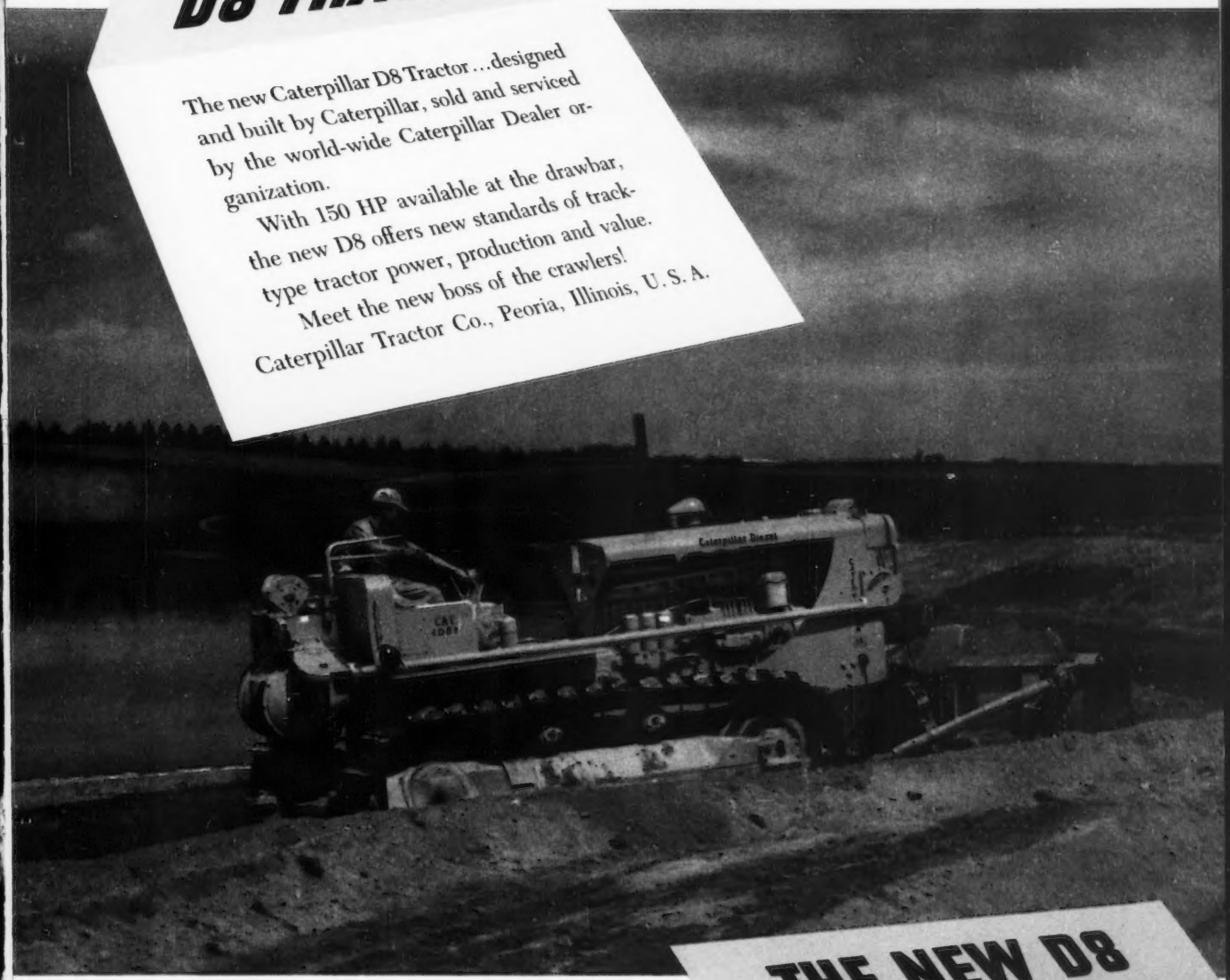
More Power... More Profit... More Production...

The new Caterpillar D8 Tractor ...designed and built by Caterpillar, sold and serviced by the world-wide Caterpillar Dealer organization.

With 150 HP available at the drawbar, the new D8 offers new standards of track-type tractor power, production and value.

Meet the new boss of the crawlers!

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.



THE NEW D8 Boss of the Crawlers

- The new D8 has more drawbar horsepower...horsepower that works for you.
- The new D8 is compact...it retains the maneuverability needed in tractor applications.
- The new D8 is versatile...matched to Caterpillar-designed Bulldozers, Scrapers, Rippers and Pipe Layers.
- The new D8 is also a pusher...available attachments make this machine a powerful push tractor.

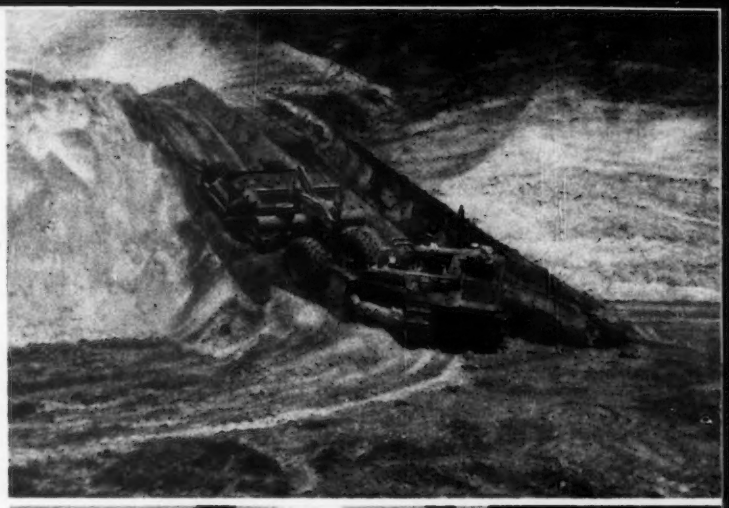
CATERPILLAR

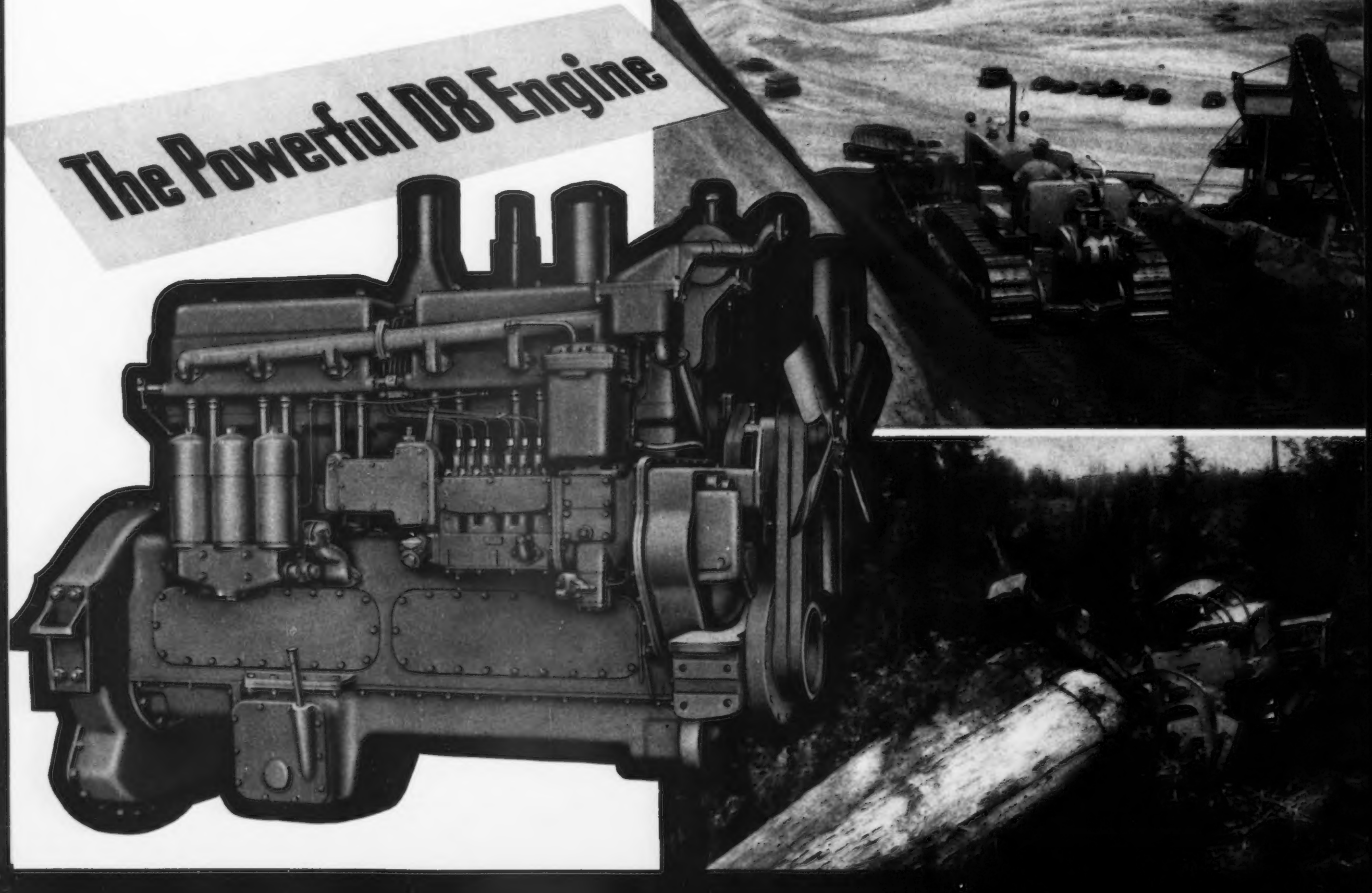
REGISTERED TRADE MARK ®

150 Drawbar Horsepower Provided by Caterpillar D8 Engine

The new high performance of the Caterpillar D8 Tractor stems from the 185 HP, 1200 RPM diesel engine. Important new features, built into the time-tested and job-proved Caterpillar design, contribute to longer engine life and decreased operating costs as well as higher power. Some of these features are: new cylinder head incorporating valve rotators and hardened valve seat inserts, new camshaft, aluminum alloy pistons with stainless steel heat plug in the high temperature zone and a cast-in iron band for the top piston ring groove. A larger oil pump driven from the front of the crankshaft has an exclusive throttling valve pressure control which assures correct lubrication for all moving parts from the first turn of the crankshaft.

This powerful engine, with these and many other advanced features, is one of the big reasons why the D8 gives you more value than ever before.





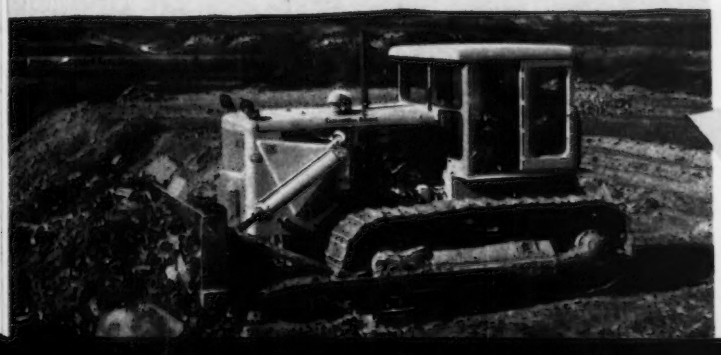
The Oil Clutch

Exclusive with Caterpillar Profitable to You...

Only Caterpillar offers you the long life and low maintenance cost of the oil clutch. The outstanding feature of this advanced clutch is that oil films absorb the friction and heat. The metallic friction surfaces do not come into contact until the last revolution or two before engagement. The clutch has its own lubrication system with gear-type pump and suction screen. The pump supplies oil under pressure to the hydraulic booster, which makes the clutch exceptionally easy to operate. Oil is also delivered to the inner diameter of the three clutch plates. This continual lubrication and cooling is the principal reason for much longer periods between adjustment and replacement than is possible with the conventional dry clutch. The oil clutch is another big reason why the D8 is a better buy.

THE NEW D8 GIVES YOU...

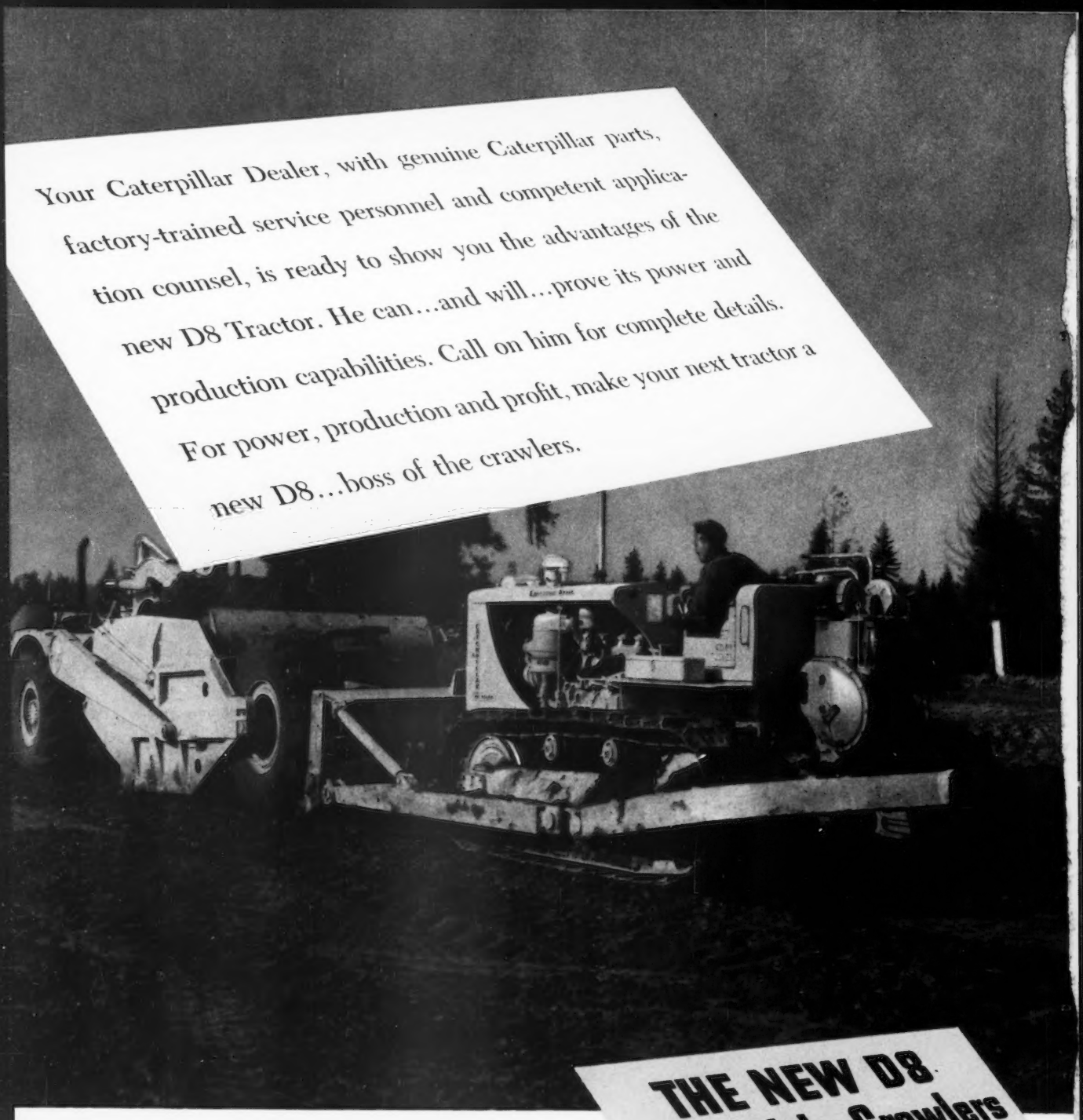
- **150 Drawbar Horsepower**
- **New Long Life Engine Features**
- **Exclusive Oil Clutch**
- **Flywheel Clutch Booster**
- **New High-Strength Frame**
- **"Hi-Electro" hardened track grouser tips**
- **Self-energizing Steering Clutches**
- **New, Large Air Cleaner**
- **Weight 38,155 lbs. (shipping weight)**
- **Compact Fuel Injection Equipment**
- **Double Universal Joint to Protect Clutch and Transmission Bearings**



Caterpillar

REGISTERED TRADE MARK ®

THE NEW D8 Boss of the Crawlers


Your Caterpillar Dealer, with genuine Caterpillar parts, factory-trained service personnel and competent application counsel, is ready to show you the advantages of the new D8 Tractor. He can...and will...prove its power and production capabilities. Call on him for complete details. For power, production and profit, make your next tractor a new D8...boss of the crawlers.

THE NEW D8 Boss of the Crawlers

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

The new Caterpillar D8 Tractor offers new highs in earthmoving production in push-tractor operations. The D8, equipped with No. 8S Bulldozer, heavy duty track roller guards, crankcase guard and tandem pusher frame, will cut your work cycles to a minimum.

Fast and maneuverable, the D8 applies a full 150 HP to the job of loading your hauling units in new record times. Push-loading, singly or in tandem, is provided to meet the conditions of your job.

PRINTED IN U.S.A.

An EIMCO Agidisc Filter
8' Diameter x 4 Disc Unit

INCREASE PRODUCTION and LOWER MOISTURE CONTENT

in dewatering metallurgical slurries with fast settling solids

Two critical factors in dewatering of metallurgical slurries with fast settling particles are improved by using Eimco Agidisc Filters.

These dependable filter units have been used on many different materials with remarkable success. In the dewatering of a copper concentrate an Eimco Agidisc was installed beside a filter of standard disc design. The Agidisc produced from 20-25% more tonnage and the discharged cake contained 1½-2% less moisture.

In the same plant a metallurgical drum type filter was running on the same feed. The moisture on the Agidisc was ½ of 1% lower than on the drum filter.

Other installations are showing equally as good or better results.

Let an Eimco engineer tell you about the Agidisc. Write for a bulletin on the Agidisc to The Eimco Corporation, Box 300, Salt Lake City, Utah.

B-21

THE EIMCO CORPORATION

Export Offices: Eimco Bldg., 52 South St., New York City • Salt Lake City, Utah—U.S.A.

You Can't Beat An Eimco

"Commercial" Steel Sets KEEP THE ORE MOVING-

Block-caving method of ore mining is more profitable when "Commercial" circular steel sets are installed in mine drifts because more continuous and more uniform draw of ore reduces mining costs. Circular steel sets provide support needed to keep the drifts open and serviceable long after timber sets would fail even in heavy ground.

The installation of "Commercial" steel sets is simpler and easier than standing timber; normal maintenance cost is less because minor repairs are reduced to a minimum. Costly shutdowns and delays are avoided; in fact, the entire operation is speeded up.

"Commercial" was first to produce circular steel sets. An established product for years again has found acceptance in another more recent application which has helped to reduce the hazards in block-caving mining.

Pounds of "Commercial" circular sets will increase the ore draw in tons.

THE COMMERCIAL SHEARING AND STAMPING COMPANY

YOUNGSTOWN 1, OHIO • CHICAGO, ILLINOIS • SALT LAKE CITY, UTAH

"COMMERCIAL"
"PRODUCTS PREFERRED BY CUSTOMER ACCEPTANCE"

"Commercial" engineers will gladly assist you; they have the experience and know how.

LINER PLATES • RIBS • SETS • LAGGING

LA-8

DEAN A. W. FAHRENWALD, head of the college of mines at the University of Idaho for 21 years, has announced that he will retire Sept. 1 to do consulting work and engage in manufacturing.

The resignation of **Walter J. Williams** as general manager for the AEC was announced Jan. 25 by general manager **K. D. Nichols.** After ten years of continuous service as a senior staff member of the atomic energy program, Mr. Williams will take a position as vice president of the Taconite Contracting Corp., a subsidiary of the Erie Mining Co. During his military service, Mr. Williams was awarded the Legion of Merit for "outstanding services" with the Manhattan Project.

Samuel H. Morris of Globe, Ariz. has been elected a Director of Miami Copper Co. Mr. Morris is Washington attorney for Miami and is a member of the firm of Morris and Malott in Globe.

Louis Avery is a member of the engineering staff of Calera Mining Co., at Cobalt, Idaho.

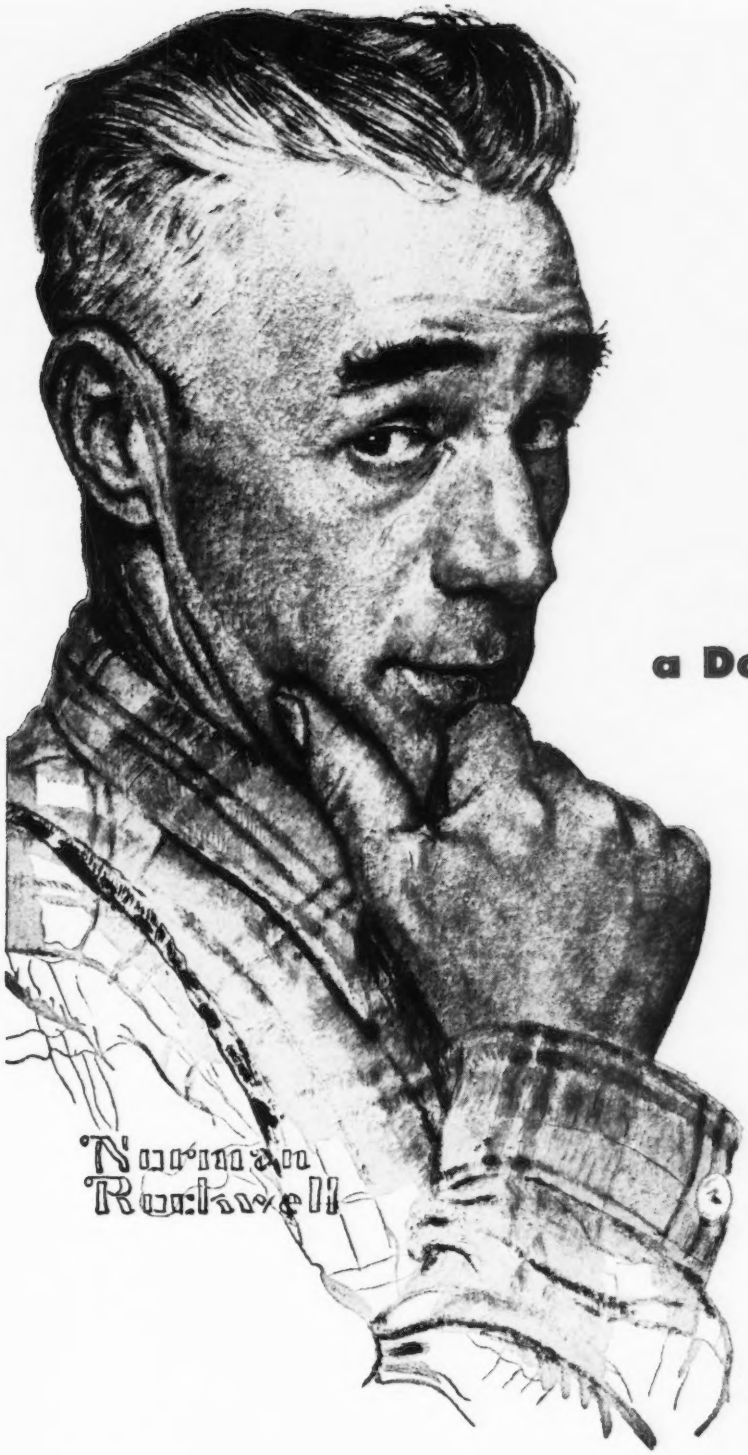
Herbert C. Lindstrom, former test engineer at Phelps Dodge, Morenci, Ariz., is now serving as minerals engineer, ceramics and minerals lab, with the Armour Research Foundation of the Illinois Institute of Technology.

H. W. Ward, former metallurgist in the research laboratory of Hanna Coal & Iron Corp., Hibbing, Minn., is now chief

CORRECTION

The January issue of E&MJ contained an erroneous statement in the Personals column, in which Sherman A. White was listed as general manager for Industrial, Minera y Metalurgica de Oaxaca. Mr. White was formerly engineer in charge of the mill and mines. Ward H. Broadfield is president and general manager of Industrial, Minera y Metalurgica de Oaxaca, at Oaxaca, Mex.

On p 113 of the January issue, an item stated that "GSA has announced that it will buy 18.7 pounds of refined copper from the Holden Co. of the Howe Sound Co." The figure in the item should have been "18.7-million pounds."



You?...

a Doubting Thomas?

IF YOU'RE a man who has to be shown, we're right in your corner. Just give Roebling "Blue Center" Steel Wire Rope one try... see for yourself how it saves time and costs you less on the job.

Two out of three wire rope users in the mining field prefer Roebling rope. Call your nearest Roebling office for a Field Man to suggest the best rope for your purposes.

ROEBLING CF&I

A subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE TRENTON 2, N. J.

THE SHOW MUST GO ON

Its ability to take it and carry on has established Naylor light-weight pipe as a star performer in mining service. The extra collapse strength provided by Naylor's exclusive lockseam-spiralwelded structure plus ease of handling and installation have earned top billing for Naylor in high and low pressure air and water service. If this is the kind of performance you need, write for Naylor Bulletin No. 507 to get the complete story.

NAYLOR PIPE

Naylor Pipe Company • 1243 East 92nd Street, Chicago 19, Illinois

Eastern U.S. and Foreign Sales Office: 350 Madison Avenue, New York 17, New York

chemist for the Hanna Nickel Smelting Co., Riddle, Ore.

OBITUARIES

Donald C. Brown, 90, one of the most prominent American mining men in Mexico, died Jan. 18 after a long illness. He retired some years ago as president of the Fresnillo Co.

Frank Erno, well known mining engineer, passed away Sept. 19, 1953, at his home in Auburn, Calif., after an illness of several months' duration. Mr. Erno was most recently associated with the Thurman and Wright Gold Dredging Co., San Francisco.

Lawrence M. Bradford, 72, owner of the Daulton Copper Mine near Madera, Calif., died Dec. 31 following a heart attack. In addition to operating his mine, he was associated with his nephew, **J. Wesley Smith,** in operation of the Mount Raymond lead and zinc mine near Madera.

Louis S. Heilig, 62, professor at the school of mines and metallurgy, University of Minnesota, died Jan. 28 at Asbury hospital, Minneapolis, where he was under treatment for a heart ailment.

William M. Sixt, 70, familiar figure in Northern Ontario mining camps for many years, died in Toronto. A former manager of Kirkland Lake Gold Mining Co., he left the firm in 1953 to go into private consulting practice.

Charles Gutchell, 70, former chief chemist at the Anaconda Reduction Works of the Anaconda Copper Mining Co., died in Anaconda, Mont., Jan. 14.

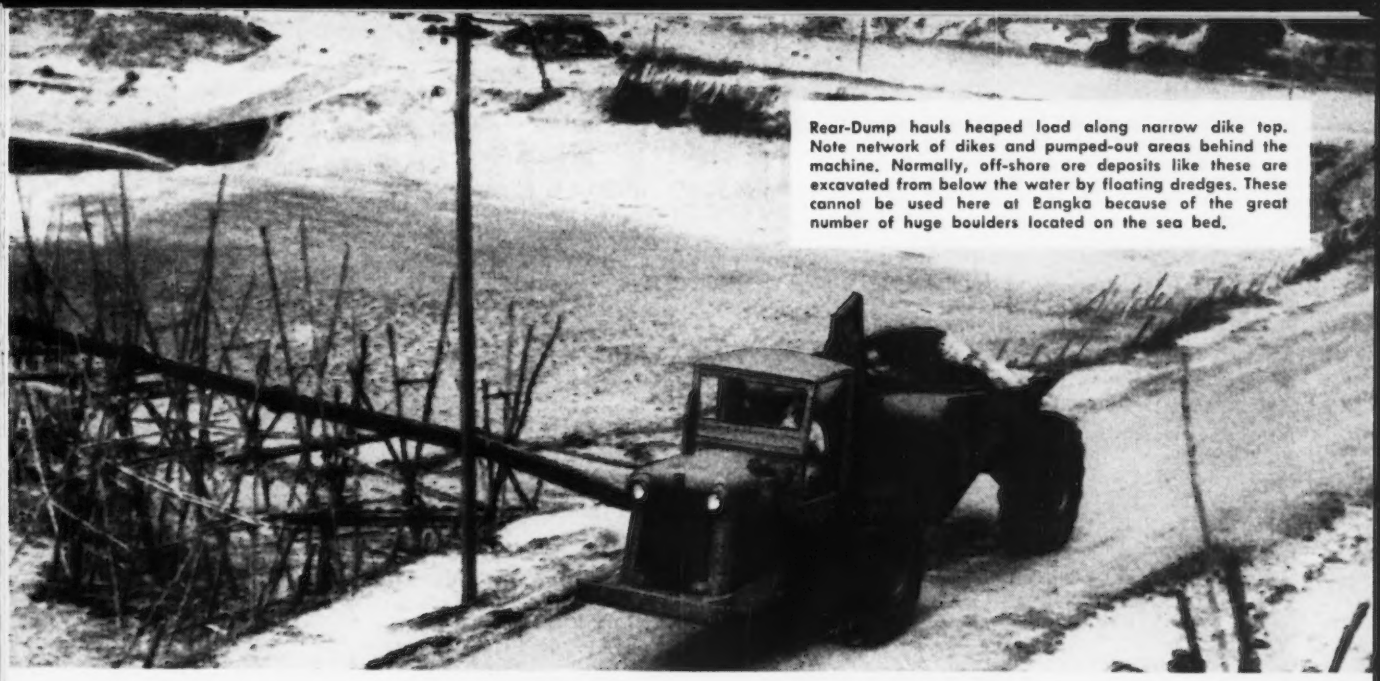
Bert Leonard Cripps, vice president of Chief Consolidated Mining Co., died Jan. 11 in Salt Lake City at the age of 71. He joined Chief Consolidated in 1916, serving successively as accountant, assistant secretary and assistant to the president prior to becoming the company's vice president.

William F. Kett, 83, retired general manager of Mountain Copper Co., San Francisco, died Jan. 30 in Berkeley, Calif. Mr. Kett came to California in 1905 to become assistant general manager of Mountain Copper. He also was associated with Gates Iron Works, Sheffield, England.

Dr. Lewis E. Young, 75, widely-known mining engineer, died Dec. 27 at his home in Pittsburgh. A past president of AIME (1949), Dr. Young taught at Iowa State College and was later a director of the Missouri School of Mines. He retired as vice president of Pittsburgh Coal Co. in 1939 to become a consulting engineer.

Morris P. Kirk, 79, pioneer figure in western mining and founder of Morris P. Kirk & Son, which operates three smelting plants, died Feb. 9 at his home in San Marino, Calif.

Allan H. Butz, 51, vice president of the international division of Minnesota Mining & Manufacturing Co., died unexpectedly Feb. 15 at Del Ray Beach, Fla., while vacationing.



Rear-Dump hauls heaped load along narrow dike top. Note network of dikes and pumped-out areas behind the machine. Normally, off-shore ore deposits like these are excavated from below the water by floating dredges. These cannot be used here at Bangka because of the great number of huge boulders located on the sea bed.

Indonesia moves ocean to mine tin

ABOUT 300 miles southeast of Singapore, off the Indonesian island of Bangka, lies a network of dikes similar to those in the Netherlands. The purpose of the Indonesian dikes is far different, however, from those in Europe. In the Pacific, dikes are built of sand, stabilized by a mat of thick vines. They form a honeycomb of coffer-dams which enclose large areas of shallow sea water. The water is pumped out, uncovering the sea bottom with its rich tin deposits for mining by conventional dry-land methods. The mining is comparatively easy; the complicated part is constructing the dikes. All material must be hauled along tops of existing dikes which are so narrow and uneven that a vehicle is often in danger of skidding off into the sea.

Rear-Dumps haul 11,100 yds. monthly

Mine officials first tried ordinary trucks to do this hauling. They proved unsuitable. They could not turn on the narrow dike tops and their small tires could not develop enough traction for safety. Then three 9-ton D Tournapull Rear-Dumps were brought in. Their electric controls, positive power steer, big low-pressure tires, and 4-wheel air brakes gave operators perfect safety on the slippery narrow dikes. Shovel-loaded, these LeTourneau-Westinghouse rear-dump units carried 7 cubic yards of sand per trip. They hauled rapidly, and turned easily within a radius of 12 ft. 1 in. When haul was 1½ miles one-way, they moved 11,100 bank yds. of sand per month. All 3 Rear-Dumps worked to great satisfaction despite the difficult job conditions and corrosive sea salt.

Order 16 additional units

Because of Tournapulls' dependability and fast, steady production, the management of the Bangka Tin Mines was able to complete construction of the dikes in time before the monsoon season began. With results like these, the mining management has ordered 16 additional 9 and 18-ton Rear-Dumps for use in open-pit tin mining on the island.

If you too have problems in speeding up on your earthmoving — or in hauling over rough narrow roads — or in reducing maintenance costs, it will pay you to investigate the modern, high-speed Tournapull. There is a size machine to fit your needs — 9, 18, 35, and 50 tons.

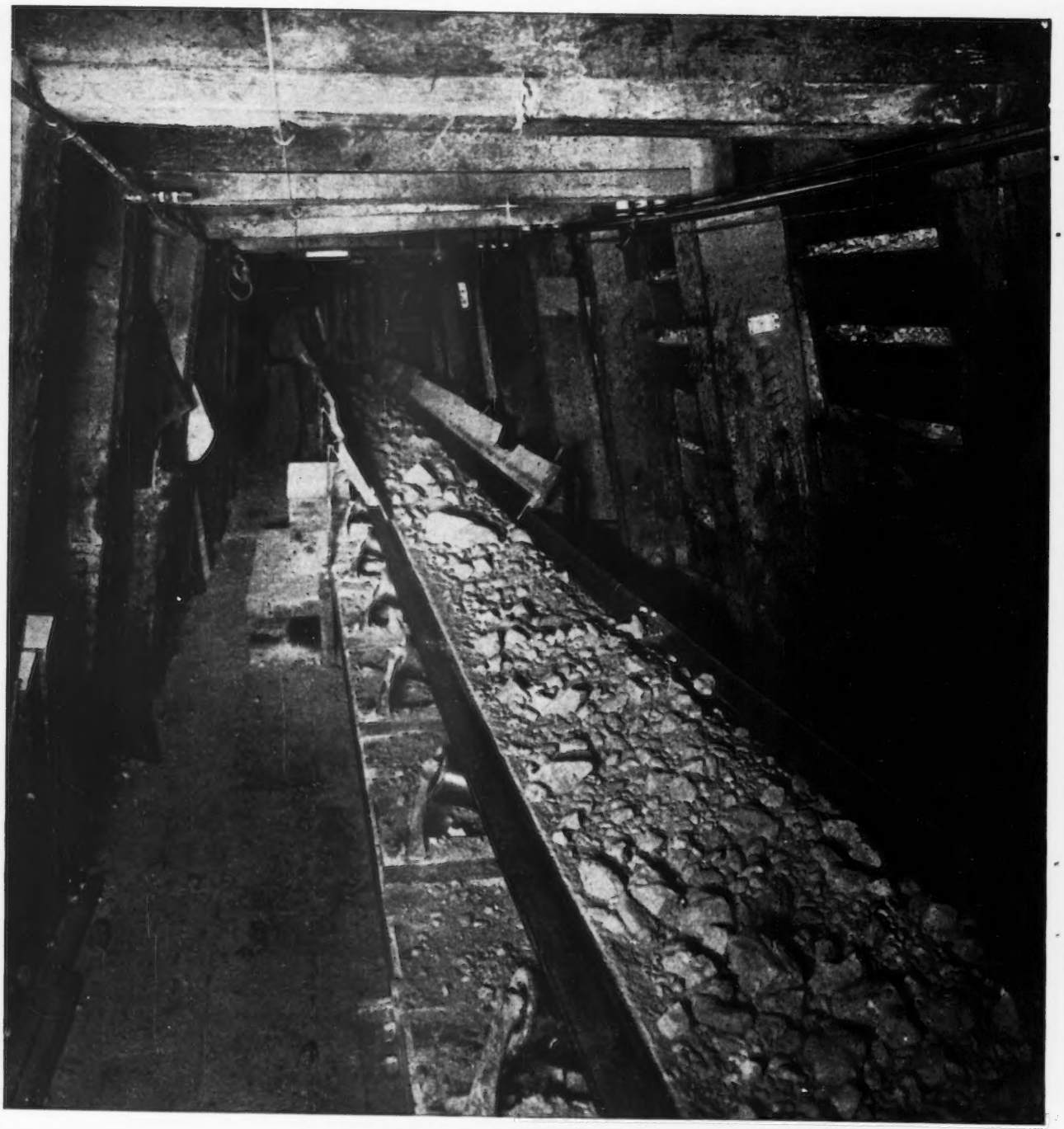
Tournapull—Trademark Reg. U.S. Pat. Off. DR-341-M-b

LeTourneau - Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

A Complete Line of Belt



HEWITT-ROBINS

EXECUTIVE OFFICES, STAMFORD, CONNECTICUT

Conveyors to Handle Ore

Whenever you handle ore in bulk—underground, overland, in open pit or mill—Hewitt-Robins belt conveyor systems will provide the most efficient, most economical answer.

Hewitt-Robins designs and manufactures a complete line of belt conveyor systems . . . Sectionalized Ore Mine —Mine-Type Shuttle—Engineered . . . each one matched to the requirements of a particular type of ore handling operation.

All Hewitt-Robins belt conveyor systems are backed by unified responsibility. Because Hewitt-Robins is the only company that designs and manufactures *both* the belting *and* specialized machinery, and assumes full responsibility for successful operation from drafting board to installation.

ENGINEERING DATA

FOR BLOCK CAVING: Hewitt-Robins sectionalized ore mine conveyors maintain a steady flow of ore in haulage drift or sub-drift under grizzly level . . . eliminate down time for timber repairs and replacement . . . assure less chance of breaking in stopes or arching in the chutes . . . provide faster withdrawal of block being mined.

FOR UNDERGROUND HAULAGE: Hewitt-Robins sectionalized ore mine conveyors and mine-type shuttle conveyors provide continuous transportation from working face to points of beneficiation. The mine-type shuttle conveyor answers the problem of truly continuous mining . . . it follows the working face and at the same time maintains a fixed transfer point through a fixed tripper—unit is extendable or retractable up to 600' . . . Sectionalized ore mine conveyors for main and stope haulage are available in 8' and 12' sections suitable for 3' and 4' idler spacing with choice of 24", 26", 30", 36", 42" and 48" belt widths.

FOR OVERLAND, OPEN PIT AND MILL HAULAGE: Hewitt-Robins engineered conveyors are designed to meet particular local conditions. They are available in belt widths from 16" up to 72" . . . are supplied with anti-friction, offset demountable-type idlers with 2½" diam. idler rolls (where minimum vertical clearance is available) up to 7" diam. rolls (where conditions require).

Here is a partial list of

HEWITT-ROBINS PRODUCTS

that will help you cut handling costs and increase operating efficiency.

MACHINERY

Belt Conveyors
Belt & Bucket Elevators
Car Shakeouts
Conveyor Idlers
Dewaterizers
Mechanical Feeders
Foundry Shakeouts
Mine Conveyors
Reclaiming Systems
Screen Cloth
Stackers & Trippers
Vibrating Conveyors & Screens

INDUSTRIAL RUBBER PRODUCTS

BELTING:

Conveyor
Elevator
Transmission

HOSE:

Acid
Air & Air Drill
Barge Loading
Dust Suction
Fire
Fuel Oil & Gasoline
Gasoline Pump
Mud Pump Suction
Oil Suction & Discharge
Propane-Butane
Road Builders'
Rotary Drilling
Sand Blast
Sand Suction
Sea Loading
Servall®, All-Service
Steam
Tank Car & Tank Truck
Vacuum & Air Brake
Water & Water Suction
Welding, Twin-Weld®

•

For information and service on industrial rubber products, contact your Hewitt-Robins Industrial Supply Distributor. Through his complete stock of Hewitt-Robins Rubber products, and his familiarity with local field conditions, he can fill your supply needs promptly and correctly. See Classified Phone Book for the Hewitt-Robins Industrial Supply Distributor serving your area.

1444

INCORPORATED

DOMESTIC DIVISIONS: Hewitt Rubber • Robins Conveyors • Robins Engineers • Restfoam
FOREIGN SUBSIDIARIES: Hewitt-Robins (Canada) Ltd., Montreal • Hewitt-Robins Internationale, Paris, France • Robins Conveyors (S. A.) Ltd., Johannesburg • **EXPORT DEPARTMENT:** New York City.

OPERATING IDEAS

Main-haul hitch used in 50-hp installation.

Back-haul hitch is slightly modified in design

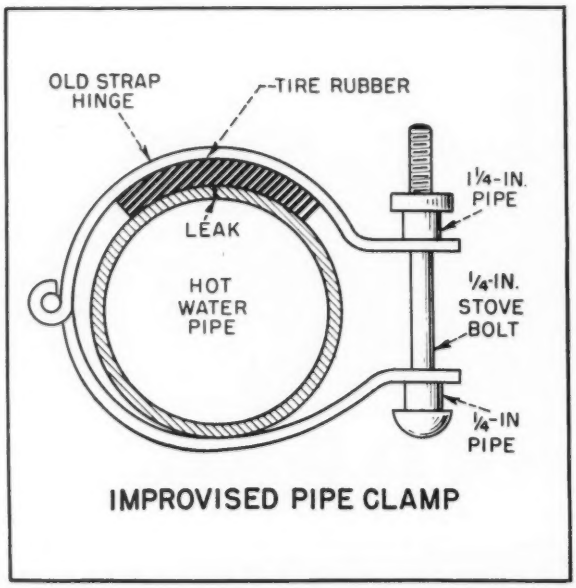
Dragline Crowsfoot Hitch Improves Scraper Performance

A NUMBER OF HITCHES have been tried out on the 50-hp scrapers at Granby Consolidated Mining Smelting & Power Co. operations at Copper Mountain B.C. over the past years, but none proved entirely satisfactory. D. W. Pringle, mine superintendent, reports that more recently the company worked with a local foundry to devise a regular type dragline "crowsfoot." By redesigning one end of the hitch the device proved useful on the scraper nose and on the backhaul. The hitch is manganese and will take 1 to 1⅛-in. cable.

Several of the hitches have served for more than a year without replacement. Advantages of this new hitch over the old type shackles are: (1) No ball of broken ends develops as new knots are tied. (2) Less broken cables at the hitch because it is better protected. (3) Less cable is wasted because only 1 ft is required as against 4 ft for a tied knot. (4) The cable can be attached much faster than by the previous method.

Quick Pipe Repair

A SUDDEN BAD LEAK in a hot water pipe which started to pour out about an inch of water on the concrete floor, caused Thomas E. Smith, Route 1, Pueblo, Colo., to think fast and act still faster. Here is how he stopped the leak: Lacking a pipe clamp, he found an old hinge strap which he pounded roughly into the shape shown in the sketch. Next he cut off a piece of side wall from an old tire, and a piece of inner tube, both to fit beneath the roughly fashioned pipe clamp. Two short lengths of ¼-in. pipe served as washers. Even though the hot water was squirting about, he managed to grasp the two ends of the clamp with a 10-in. pliers, squeeze the clamp shut and bolt it and stop the leak. The quick patch has served effectively for more than two months.



IMPROVISED PIPE CLAMP

pass through these six 24" dia. DorrClones*!

This compact installation of six 24" dia. DorrClones, is located in the by-product plant of a large mineral producer in the Western United States. 9000 tons per day of minus 65 mesh flotation tailings are deslimed and dewatered prior to gravity concentration of wolframite, cassiterite, etc. DorrClones were selected for this operation for three reasons.

FIRST — A relatively fine separation was required at low dilution without dispersing agents.

SECOND — Space and headroom were severely limited.

THIRD — The initial cost was lower than for any other type of classification equipment.

Over a three months period, operating data have averaged as follows:

	FEED	OVERFLOW	UNDERFLOW
% Solids	35.9	27.0	61.2
GPM	542	432	110
TPD Solids/unit	1500	842	658
% Recovery		56	44

MESH	CUMULATIVE % PLUS THE MESH		
65	5.3	1.1	15.4
100	15.8	2.6	40.2
150	28.4	6.8	60.1
200	42.9	18.1	75.8
—200	57.1	81.9	24.2

If you have a desliming problem, there's a good chance that the DorrClone, with its high-capacity-for-size and ability to handle flocculant or heavy pulps, will be the solution. For further information write for Bulletin No. 2500, The Dorr Company, Stamford, Conn.

* DorrClone is a trademark of The Dorr Company, Reg. U. S. Pat. Off.

Better tools TODAY to meet tomorrow's demand

DORRCO

DORR

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.
Offices, Associated Companies or Representatives in principal cities of the world.

THIS MONTH IN MINING

Merrill E. Shoup (seated), president, Golden Cycle Corp., listens in rapt attention as Ray B. Wiser, president, Walkeng Mining Co. of Berkeley, urges return to gold standard.

Wreathed in smiles are these uranium miners (left to right): Virgil Bilyou, Mitchell Melich and Charles Steen, all of the Utex Exploration Co., Moab, Utah.

Uranium Smiles, Lead-Zinc Frowns Spice National Western Mining Conference

CHARLES E. NEWMEYER
E&MJ Colorado Correspondent

NATIONAL WESTERN MINING CONFERENCE in Denver's Shirley Savoy Hotel will long be remembered —and not only because a 2000 attendance made it the largest such meeting in Colorado history.

The three-day Conference, which ended Jan. 30, will be recalled also as an interesting study in contrasts: the buoyant spirits of uranium miners and the sagging but militant spirits of lead-zinc producers.

Uranium miners found plenty of support for their soaring optimism while lead-zinc producers were embroiled in pyrotechnical debates of the tariff question, spiced with more than a dash of bitters.

Phillip L. Merritt, assistant director, AEC raw materials division, said that "In the past three years, at least 11 additional deposits each having a potential production in excess of 100,000 tons of ore have been discovered or developed on the Colorado Plateau." He estimated that a 100,000-ton uranium mine could be valued in present day prices at $3-million.

Fred Sims, U. S. Geological Survey in Denver, characterized as "favorable" uranium prospects on the Front Range of Colorado's Eastern Slope.

Sheldon P. Wimpfen, manager, AEC Grand Junction office, commented that the "greatest period of opportunity for the uranium industry in the United States lies just ahead."

Charles A. Steen, the 34-year-old King Midas among uranium miners, disclosed that in 1953 he took $2.4-million worth of uranium out of his Mi Vida mine.

While the uranium miners sang a theme of expansion and tomorrow's bonanza, the lead-zinc miners provided the counterpoint.

Harold S. Worcester, Colorado Mining Assn. President, Dies

MEMBERS OF THE MINING INDUSTRY were shocked to learn of the sudden death Feb. 1 of Harold S. Worcester, 62, at St. Joseph's Hospital, Denver, Colo. The death of the widely-known mining consultant occurred just four days after he was elected president of the Colorado Mining Association.

Mr. Worcester

As president of the association, Mr. Worcester succeeded Harrison S. Cobb, of Boulder. Charles A. Chase of Silverton was elected honorary president of the organization.

The lead-zinc producers lifted their voices loud and long in favor of protective tariffs. And they reacted vehemently when Charles P. Taft, brother of the late Ohio Republican Senator, hit what they regarded as a discordant note.

Charles P. Taft, president, The Committee for a National Trade Policy, might win a medal for bravery but he certainly would have placed last in any popularity contest at the Conference.

Knowing full well that he was twisting the lion's tail, Taft said flatly that higher tariffs won't cure the mining industry.

Instead, he proposed subsidies, direct and indirect, to aid high-cost near-marginal operations. "It's silly to say that imports destroy American industry," he said, and added that "That holds true for lead and zinc, too."

Otto Herres, chairman, National Committee on Lead & Zinc and vice president, Combined Metals Reduction Co., Salt Lake City, launched a direct frontal attack on Taft by saying that "his brother was for us—but this man is very different from his brother."

Andrew Fletcher, president, St. Joseph Lead Co., and a front-line warrior for protective tariffs, said that many of Taft's allegations were based on misinformation about the lead and

(*Continued on p 192*)

Production of Rare and Precious Metals Increases Gold, Beryllium 1953 Output Up; Silver Down 2%

EXCEPT FOR SILVER, U.S. output of rare and precious metals on which the Bureau of Mines compiles data increased during 1953.

The items include beryllium, columbium-tantalum, gold, silver, rare earths, and zirconium-hafnium.

Beryllium supply exceeded demand during 1953. The new supply of beryllium ore (beryl) was the greatest in history. As the result of resumption of production of master alloys, metal, and compounds by a second primary producer, an ample supply of basic material was available to fabricators and producers of end-use products. Although domestic mine shipments of beryl exceeded those of 1952, they continued to make up less than 10% of total new supply.

Increased supplies of columbium-tantalum ores and a decrease in defense demands led to relaxation of Government controls on end-uses of these strategic metals for nondefense purposes. Even though domestic production of columbite-tantalite was many times greater than in 1952, over 99% of the 1953 supply was imported, largely from Nigeria.

Gold production in the continental United States was 2% greater in 1953 than in 1952, as increases in output from straight gold mining and byproduct production of gold from base metal mines in some areas more than offset declines in others.

Silver production was down 2% from 1952, reflecting lower prices for lead and zinc that closed some mines producing these metals with silver as a byproduct.

Monazite operations in the Long Valley field of Idaho, discovered by the Bureau of Mines in 1950, continued to be the largest source of the rare-earth metals. Work continued on metallurgical problems involved in the beneficiation of bastnasite, a rare-earth mineral, large deposits of which are found in California and New Mexico. During 1953, for the first time since 1950, imports of monazite were received.

Private companies expressed increased interest in the production of metallic zirconium and hafnium. The Bureau of Mines, in order to meet Atomic Energy Commission requirements, continued to produce the major part of these metals. The production of hafnium-free zirconium resulted in ductile hafnium metal being available in more than laboratory quantities for the first time in history. Hafnium and zirconium have important atomic energy uses.

Government's Purchases of Domestic Critical Minerals

QUANTITIES OF STRATEGIC MATERIALS acquired through Dec. 31, 1953, under the Government's programs for domestic tungsten, manganese, chrome, mica, beryl, asbestos and columbium-tantalum were announced recently by Edmund F. Mansure, administrator of General Services.

These programs, Mansure pointed out, are separate from the exploration program of the Defense Materials Exploration Administration. The items covered follow:

Tungsten—Purchase of 3-million short ton units of concentrates authorized. Delivered to date: 599,893 short ton units.

Manganese — Authorized: 6-million long ton units of Mn for Butte and Philipsburg together; 6-million for Deming; 6-million for Wenden; and 19-million for the carload program. Delivered to date: Butte and Philipsburg, 428,809 units; Deming 789,618 units; Wenden 2,089,283 units; carload program 557,252 units.

Chrome ore—Purchase of 200,000 long tons of ore and concentrates has been authorized. Delivered to date: 46,640 long tons.

Mica—It is accepted in three forms, block, film and hand-cobbed. Under a revision of the program announced July 23, 1953, the three purchasing depots will accept non-ruby mica, subject to electrical tests, as well as ruby mica.

Purchase of 25,000 short tons of hand-cobbed mica or the equivalent has been authorized. Delivered to date: 2,593 tons of all types.

Beryl — Authorized purchases 1,500 short tons. Delivered to date: 145 short tons.

Asbestos—Crysotile in three grades, Crude Nos. 1, 2 and 3, accepted at Globe, Ariz. Purchase of 1,500 short tons of No. 1 and/or No. 2 has been authorized. Crude No. 3 which is accepted on a tie-in basis with the other grades is not figured into quantity authorized. Delivered to date, in terms of program, 176 tons of No. 1 and No. 2.

Columbium-Tantalum — Purchase of 15-million pounds of contained combined columbium-tantalum pentoxide has been authorized from domestic and foreign sources. Delivered to date: 3,485,507 pounds.

Mining Calendar

Pacific Northwest Metals & Minerals Conference, April 29-May 1, Multnomah Hotel, Portland, Ore.

American Mining Congress Metal & Nonmetallic Mining Convention and Exposition, Sept. 20-24, Civic Auditorium, San Francisco, Calif.

AIME Industrial Mineral Division Fall Meeting, Oct. 5-9, Whiteface Inn, Lake Placid, N. Y.

National Metal Congress, National Metal Exposition, Nov. 1-5, Palmer House, Chicago.

News Highlights

Twelve "small" iron ore companies in Lake Superior district shipped combined total of 4,936,568 tons of ore in 1953. **Page 122.**

Toronto engineer says nickel deposit at Yakobi Island may cause construction of a reduction mill "as big as the Alaska-Juneau." **Page 124.**

Tungsten properties in operation in California have been reduced to seven. **Page 128.**

Forty-hour, 5-day week becomes rule in nearly all Coeur d'Alene lead-zinc operations. **Page 138.**

Incentive block-leasing system at Spokane-Idaho Mining Co's Constitution mine results in 15% increase in production per man-shift. **Page 140.**

Approximately 9000 Kennecott Copper Corp. employees in Utah and Nevada began a 40-hr work week in mid-February. **Page 152.**

Howe Sound Co. and Chemical Construction Corp. have reached agreement concerning operation of a new cobalt refinery at Garfield, Utah. **Page 154.**

Spotlight this past winter has been on the new base metal field on Ontario's Manitouwadge. **Page 158.**

Work is in progress for shaft-sinking at New Brunswick's New Larder U Island Mines. **Page 162.**

Lithium salts are to be exported from Southern Rhodesia to Britain and the United States this year. **Page 164.**

Two Atomic Energy Commission experts have arrived in La Paz to aid Bolivia's search for radioactive minerals. **Page 169.**

Mexican Sulphur's plant at San Cristobal has reached a 500-ton daily production. **Page 174.**

Small scale metallurgical establishments in Russia's Urals have been sharply criticized for failure to operate efficiently. **Page 178.**

Germany's famed Bochum Mining Museum, damaged during World War II, has been fully restored and will be expanded. **Page 188.**

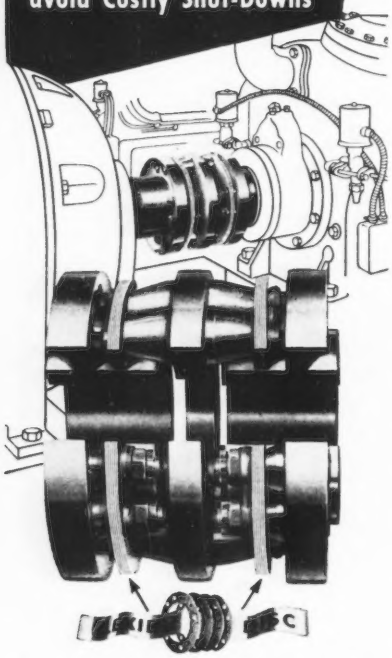
Special feature on dredging Idaho sands. **Page 190.**

Architect's drawing of new $12.5-million triple superphosphate plant near Bartow, Fla. **Page 192.**

Atomic Energy Commission opens more uranium land for mining on the Colorado Plateau. **Page 194.**

Union Pacific Railroad has announced discovery of a huge titanium-iron ore deposit in Wyoming. **Page 194.**

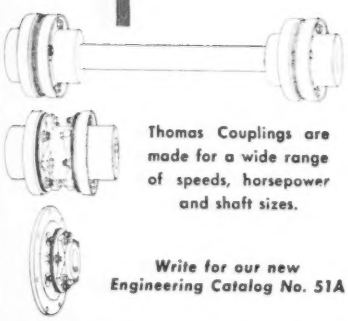
Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes.

Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

12 'Small' Iron Ore Companies Shipped 'Big' Tonnages In '53

E. S. TILLINGHAST

E&MJ Iron Country Correspondent

OPERATING IN AN AREA of industrial giants, so-called small iron ore mining companies nevertheless make contributions to Lake Superior production which are apt to be overshadowed.

Twelve of these companies produced a combined total of 4,936,568 tons of ore in 1953. Only four of the "oldline", larger companies shipped a greater tonnage than this total: U. S. Steel's Oliver Iron Mining Division; Pickands, Mather & Co.; M. A. Hanna Co., and Cleveland-Cliffs Iron Co.

When it is remembered that much of the nearly 5-million tons of ore came from properties that had previously been listed as exhausted, idle for a long period of years or as containing too little recoverable ore to make their operation profitable, their record is all the more remarkable.

While most of their output came from the Mesabi, the Cuyuna, Gogebic, Marquette and Menominee ranges also contributed.

Zontelli Brothers was the only one of the twelve that operated on four ranges. Eight of the twelve obtained all their production from the Mesabi. The Vermilion range had no representation in the list, probably because there is little potential ore property available for leasing on that range and also because of the higher cost of exploring, opening up and developing an iron ore mine on the predominantly underground Vermilion. All operations of the twelve companies are by open pit methods. Five of them produced their tonnage from a single property.

Pacific Isle obtained its 551,677 tons from twenty properties—the largest number of operations of any one of the twelve. W. S. Moore Co. produced from ten properties and Zontelli Brothers from nine. E. W. Coons Co. was next with seven producers, followed by Haley-Young with five and Rhude & Fryberger and North Range with four each.

W. S. Moore Co. led in production with 731,962 tons; Rhude & Fryberger were second with 704,027 tons; Zontelli Brothers had 626,869 tons; Pacific Isle, 551,677 tons; North Range, 511,377 tons; E. W. Coons Co., 502,642 tons; Pioneer Mining Co., 502,016 tons, and Haley-Young, 300,175 tons.

Charleson Iron Mining Co., from its concentration plant at Virginia (its only present operation), produced 192,660 tons from lean ore stockpiles that, because of their refractory nature, had long remained untreated.

The other three that make up the twelve are Skubic Brothers, 126,202 tons; Jessie H. Mining Co., 167,256 tons, and Globe Iron Co. (Iron Mountain, Mich.), 19,705: the smallest producer of the "small" list.

Biggest producing single property of the 64 operations conducted by the group was the Mary Ellen mine of the Pioneer Mining Co. which shipped 502,016 tons. The Boeing mine at Hibbing, operated by Rhude & Fryberger, shipped 300,312 tons in its first year as an open pit mine, taking second place. It was operated as an underground mine by the Cleveland-Cliffs Iron Co. from 1922 to 1927. Rhude & Fryberger's Pennington mine on the Cuyuna range was third with 270,457 tons. Zontelli Brothers were in fourth and fifth places with their Mangan-Joan and Manuel mines, both Cuyuna range operations.

Of the 64 properties which contributed to the total independent production, at least 47 had previously been operated by other companies—some to the point where they had been considered exhausted.

Twelve of the list were new and undeveloped when taken up by one of these smaller operators. Some abandoned mines they have returned to production by assuming "calculated risks" that would have appalled more conservative operators; some have been obtained by entering the highest bid when old leases had expired and were then re-offered to prospective operators; and some have been taken up after careful and intelligent study of their potentialities, with little confirming proof that ore was present, convinced one of the twelve that they were worth the chance.

In efficiency, know-how and ingenuity of operation, in essential and up-to-date equipment, in successful management and in competent personnel, these companies rank well with the larger organizations. They have earned the respect of the communities in which they operate and a definite place in the Lake Superior area's iron ore production.

Alcoa's Mobile Plant Is Now Largest In U. S.

ALUMINUM COMPANY OF AMERICA's Mobile Aluminum Works is now the largest alumina plant in the United States, after completion of a 33% expansion in capacity.

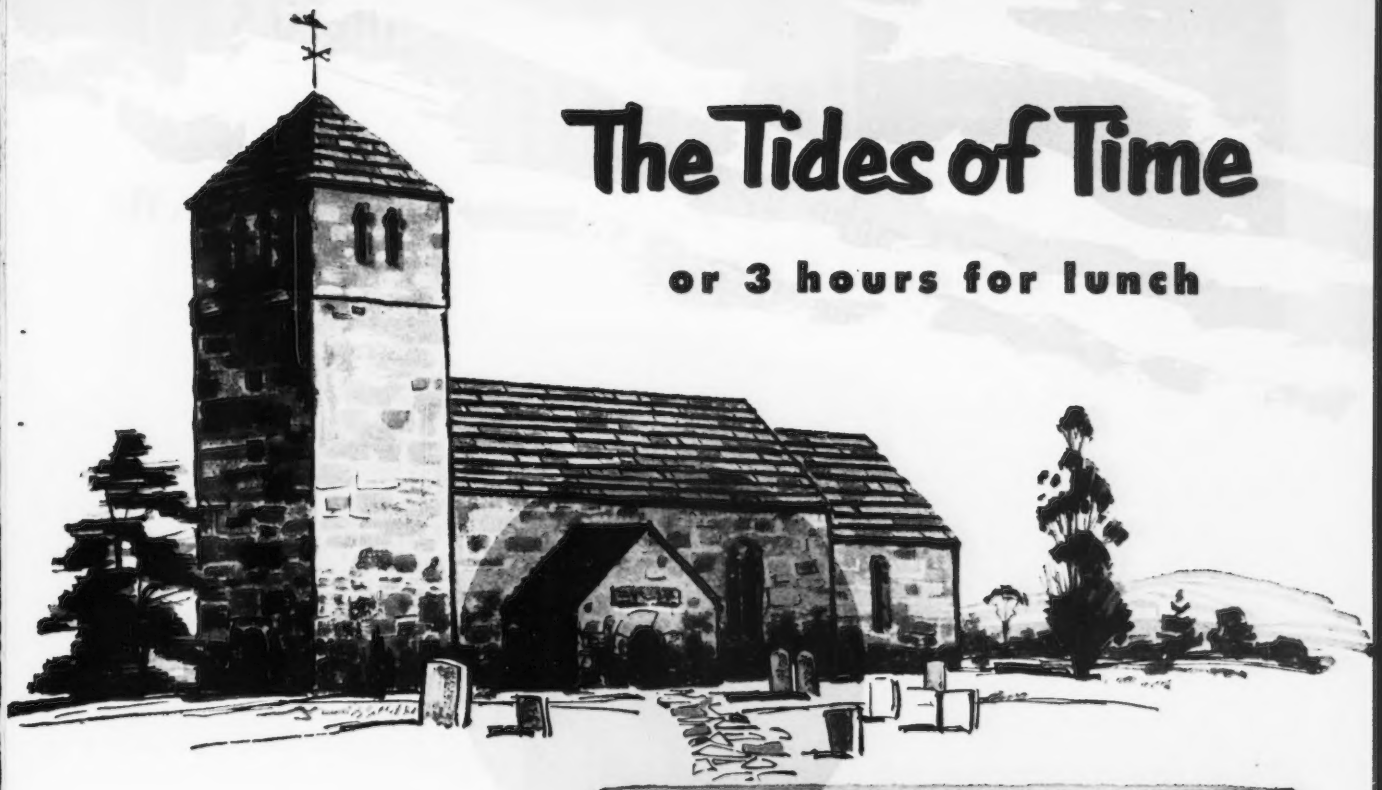
This was announced Mar. 1 by Duncan C. Smith, works manager, who added that increased facilities will make available sufficient alumina to produce more than 100,000 tons of aluminum annually.

Equipment added at the Alabama plant involved all facilities for refining bauxite under the Bayer Process. Among new installations were a digester unit, filter presses, precipitators and a calcining kiln.

In addition, new granding facilities installed are a slight modification of earlier equipment. These facilities permit handling of both wet and dry bauxite whereas the old equipment handles only dry bauxite.

The Tides of Time

or 3 hours for lunch



On this sundial on the south wall of a thousand-year-old Saxon church in Yorkshire, the day is divided into eight "Tides" of three hours each. Morgan-tide (morning-tide) is from 4:30 to 7:30 a.m.; Daeg-mael (first-tide is 7:30 to 10:30 a.m., and Mid-daeg (midday or noon-tide) is thoughtfully extended from 10:30 a.m. to 1:30 p.m.—evidently the origin of the three-hours-for-lunch idea. Measuring time in three-hour segments was probably adequate in those days when the most complex machine was the windmill, but today time is so valuable that it is one of the highest priced components in many of our projects. To get the most out of valuable drilling time, we suggest that you use Truco Diamond Bits. Their irresistible cutting power penetrates any formation, swiftly, accurately, thriftily, dependably. They are used profitably in every phase of drilling. May we send you our Diamond Bit Catalog?

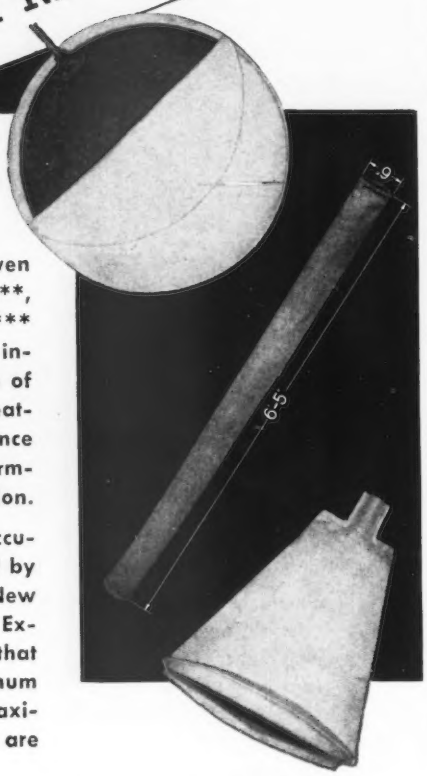
WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue **Detroit 6, Michigan**

WHEEL TRUEING TOOL CO. OF CANADA, LTD
575 Langlois Avenue Windsor, Ont., Canada

- Vacuum and Pressure Filter Element Covers
- Dust Collector Tubes, Bags and Envelopes
- Anode Bags

Let US make up your Element Coverings from NFM Filter Media



NFM Filter Media are woven from Nylon, Orlon*, Vinyon N**, Saran, Glass, Dynel, Vincel*** and Cotton. This wide range insures your obtaining the type of element covering having the greatest degree of chemical resistance and best general all round performance for your particular operation.

NFM element coverings are accurately and durably fabricated by skilled personnel at both our New Haven and Salt Lake plants. Experience has demonstrated that filter cloth costs are at a minimum and filter performance at a maximum wherever NFM products are employed.

If you are not absolutely certain as to which type of synthetic or natural fiber is best for your use send us a complete description of your operating conditions and we'll be glad to make a recommendation. Our many years of experience mean that we have quite a fund of knowledge always at your disposal.

*T.M.—E. I. Du Pont de Nemours & Co., Inc.
**T.M.—Union Carbide & Chemical Co.
***T.M.—Reg. U. S. Pat. Off.

Weavers of Industrial Filter Media for over Forty Years

NFM The National Filter Media Corp.

General Offices & Mills: New Haven 14, Conn.
Western Office & Factory: Salt Lake City 1, Utah

Sales Offices—Representatives

Chicago, Ill. 2627 West 19th St.
Cincinnati, Ohio Roselawn Center Bldg.
Houston, Texas 1406 Second National Bank Bldg.
Oslo, Norway Nicolai Friis
Johannesburg, South Africa Edward L. Bateman

IN THE U.S.

ALASKA

Big Hurrah gold mine in the Nome area is being reactivated, according to Travis P. Lane, principal owner and manager, who reported that a crew of 12 is at work in preparation for opening. Hirk Edwards is foreman. The mine has been idle for 47 years. It is reported that $1-million of gold was taken out between 1902 and 1907. Lane is a consulting engineer from Arizona.

Phil R. Holdsworth, Territorial Commissioner of Mines, has published a bulletin giving tips for Alaskan prospectors. He will give more information to those writing to Territorial Department of Mines, P. O. Box 1391, Juneau. The bulletin's suggestions include locations where uranium materials have been recognized and many suggestions concerning zircon.

Territorial Department of Mines' January bulletin listed these activities: In the first district, the lower crosscut has been driven 100-ft into the Mertie Lode at the Funter Bay nickel-copper-cobalt deposit without reaching the wall. Good mineralization in a 45-ft wide zone has been found. Diamond drilling is to continue under the DMEA program.

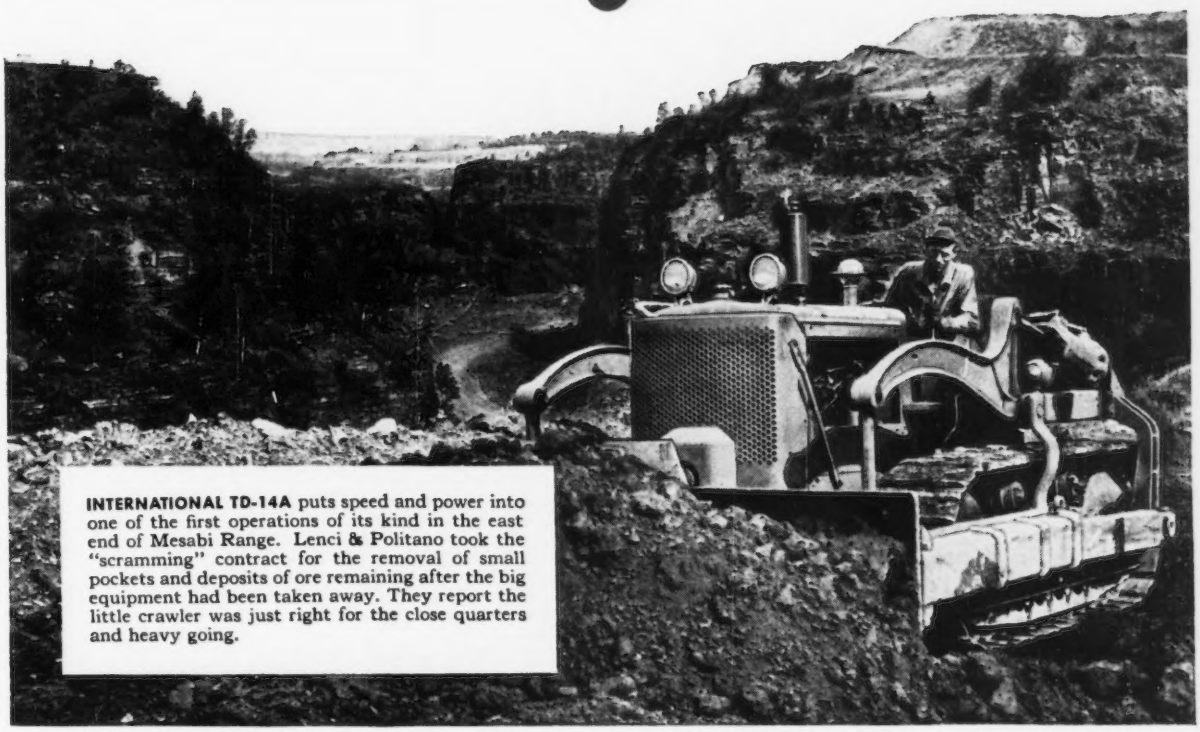
In the second district, at the Lost River Tin Mine it is expected that steady production will ultimately be possible. Flotation cells are being installed. The pumping system with 9,000 ft of water pipe is supplying 300 gpm to the mill. Material tested by the Bureau of Mines shows better ore in 32 Crosscut South than diamond drilling had first shown. This crosscut intersects on the 365-ft level the granite cupola southwest of the main shaft.

California interests had George Lingo of Anchorage stake a magnetite deposit recently at Tuxedni Bay in the third district.

E. Miles Flynn, Toronto engineer, is reported to have said in Juneau "that Yakobi Island's nickel deposit may cause construction of a reduction mill "as big as the Alaska-Juneau." A report said Flynn visited Washington, D. C., to negotiate a contract for delivering about 6½-million tons of Yakobi ore under the U. S. stockpiling program over a 7-yr period. Proven reserves, he said, would produce 60-million lb of nickel, the ore running about ½ of 1%. It has been reported that Yakobi nickel deposit in the Bohemia Basin, about 80 mi west of Juneau, will average .37% nickel and better than 25% copper.

Efforts are being made to get a suspension of military land withdrawal on Unalaska Island in order to develop sulphur resources. A new process for treatment has spurred Vancouver and B. C. businessmen to investigate the deposits. The rock is crushed, ground and put in a rotary kiln where the sulphur is melted out. The project would require 16 mi of road at a cost of about $300,000.

"Scramming" on the Mesabi



INTERNATIONAL TD-14A puts speed and power into one of the first operations of its kind in the east end of Mesabi Range. Lenci & Politano took the "scramming" contract for the removal of small pockets and deposits of ore remaining after the big equipment had been taken away. They report the little crawler was just right for the close quarters and heavy going.

INTERNATIONAL Crawler makes a big impression on east end of the Range

What's "scramming?" It's cleaning up the small pockets and deposits of ore that remain after main ore body has been worked. It is a job that brings out the special abilities of smaller crawlers in the complete INTERNATIONAL line according to Lenci & Politano, "scramming" contractors in the east end of Mesabi Range.

An INTERNATIONAL TD-14A was used in the operation. Operator Leonard Lehman, who had always handled big crawlers before, has this to say:

"The way that tractor can get around in tight corners and the size of the load it can handle were things I had not expected. It showed me there is a place for the smaller INTERNATIONAL crawler even in such a big operation as mining the Mesabi Range!"

Do you need big power— little power—or somewhere in between? See the man who can fix you up just right, and keep it rolling for you. That's your INTERNATIONAL Industrial Distributor. Get in touch with him soon for a demonstration of "power that pays!"

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.

For everything in Earthmoving

ON TRACKS ...ON RUBBER

See INTERNATIONAL'S Complete Earthmoving Line

INTERNATIONAL HARVESTER

POWER THAT PAYS

INTERNATIONAL

The tough ones come to Card

In hard rock mining, haulage equipment takes a real beating. Three-ton boulders drop ten feet and more into mine cars with a force that dents good half-inch steel plate. CARD cars have whipped these tough conditions for many of the major ore producers of the western hemisphere.

Familiar names like these and many others dot the C. S. CARD customer lists over and over with their repeat orders. CARD cars built to order for these firms cost little more than standard stock models, yet they result in large savings because they are built to handle specific mining requirements.

CLIMAX MOLYBDENUM
INTERNATIONAL MINERALS
PHELPS DODGE
KENNECOTT COPPER
U. S. VANADIUM
U. S. POTASH
VERMONT COPPER
HOWE SOUND
CALERA MINING
HOMESTAKE
TELLURIDE MINES
IDARADO
CANANEA CONSOLIDATED COPPER CO.
ANACONDA
VICTOR CHEMICAL WORKS
CLEVELAND CLIFFS IRON
POTASH CO. OF AMERICA
CONSOLIDATED MINING & SMELTING CO. OF CANADA
AMERICAN SMELT. & REF.
UNITED STATES SMELT. REF. & MINING
UNION PACIFIC COAL
GENEVA COAL CO.
COLO. FUEL & IRON CORP.
INDEPENDENT COAL & COKE
COLO. & UTAH COAL
TUNGSTEN MINING
NEW JERSEY ZINC

CARD car engineering can do the same for you. Ask us for consultation on your outstanding haulage problem. No obligation.

C.S. Card Iron Works Co.
2501 WEST 16th AVE.,
DENVER, COLORADO

ARIZONA

A boom year in copper, gloom in the lead and zinc industries, but an overall increase in production value marked Arizona mining in 1953. Copper output rose 17% in value to a record high of $226,710,000, according to the Arizona Department of Mineral Resources.

But while copper could claim its fourth best year in state history, lead and zinc were off 60 to 70%.

Copper production reached an estimated 394,279 tons, according to Roger Manning, department head. This is about the same as 1952. But higher prices accounted for the increase. Production has been exceeded only in 1929, 1950, and 1951.

The five-metal production of $249,697,080 kept Arizona first in copper, sixth in lead, and fifth in zinc.

Preliminary production figures show 112,500 fine oz gold, 4,352,000 fine oz silver, 394,279 short tons of copper, 9,300 short tons of lead, and 27,300 short tons of zinc.

Some 55 men were idled March 7 when Ray Mines Division of Kennecott Copper Corp. adopted a five-day weekly operating schedule. A. P. Morris, Ray Mines general manager, explained that the reduction in operating schedule was dictated by copper market decline. Feb. 1 Ray mines reduced its work week from 48 to 40 hr but at that time there were no lay-offs among the 1100-man work force. Prior to Feb. 1, the Division handled about 105,000-tons of ore a week. This now has been lowered to about 75,000-tons.

Five new exploration contracts provide $86,895 for Arizona mines: Richard E. Chilson, Pima County, copper, $13,575 ($27,150 total cost); Gordon R. French, Pinal, lead, $9,750 ($19,500 total cost); Carl Hovgard, Mohave, tungsten, $24,750 ($33,000 total cost); Jacques Mining Corp., Gila, asbestos, $24,400 ($26,000 total cost); Charles M. Taylor, Pima, tungsten, $15,420 ($20,560 total cost).

Arizona's biggest piggy-back ride is going to transfer a 480x250-ft building 12½ mi to the Sleeping Beauty Copper mine site near Miami.

Contract for the third-of-a-million dollar project has been awarded by Miami Copper Co. to National Steel and Construction Co. of Phoenix.

Involved is dismantling the concentrator and mill at the Castle Dome mine site, now depleted of ore, and moving 1,200 tons of steel and equipment 12½ mi to the new Sleeping Beauty mine site north of Miami, and re-erecting the plant.

All equipment will be transported through Miami's main street.

Contract calls for the work to be completed 90 days from Jan. 18.

This is the second move for the concentrator which was taken to Miami in 1943 from the Phelps-Dodge workings at Bisbee—200 mi to the south. At that time Castle Dome was rushed into production to bulwark the nation's defense needs.

Standard Engineer's Report

CASE HISTORY

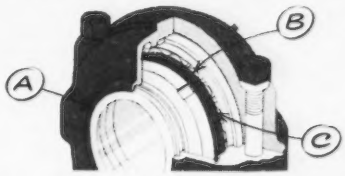
PRODUCT Calol SA Grease

FIRM Blue Diamond Corp., Blue Diamond, Nevada

Special grease stays in bearings, ends shutdowns!

CALOL SA GREASE SOLVED PROBLEM of grease melting and running onto clutch of tramway drive unit at Blue Diamond Corp. gypsum mine and mill near Las Vegas. When grease previously used got onto clutch, all operations had to be shut down. Used for three years, Calol SA Grease stays in bearings even in 110°F. summer weather. It stays soft in their sub-zero winters, protects drive unit bearings from heavy abrasive dust always present in the air. Calol SA Grease is also used in wheel bearings of tramway cars, which carry 1800-pound loads, and in many plain and anti-friction bearings in the mill itself. It comes in several grades to meet all conditions.

How to reduce wear in all types grease-lubricated machine bearings



Specialized Calol SA Grease will provide constant lubrication in high ambient and bearing temperatures—proved in mill ambient temperatures of 250°F. and Navy Ball Bearing Machine tests of 10,000 rpm and extreme temperatures.

A. Made from sodium-aluminum base...very high melting point minimizes seepage.

B. Feeds evenly to all bearing surfaces.

C. Remains soft in cold temperatures.

FREE CATALOG: "How to Save Money on Equipment Operation" will be sent on request to Standard Oil Co. of Calif., 225 Bush St., San Francisco.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

CALOL

TRADEMARK "CALOL" REG. U.S. PAT. OFF.

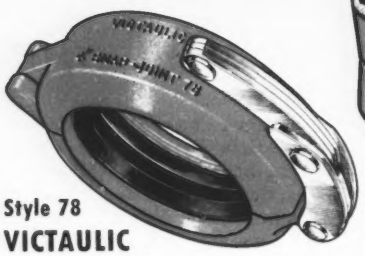
STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY
P.O. Box 780 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS
P.O. Box 962 • El Paso, Texas

VICTAULIC
METHOD OF PIPING

FOR GROOVED PIPE



Style 78
VICTAULIC SNAP-JOINT

New, boltless coupling — hand-locks — for faster hook-ups with no loose parts. Ideal for temporary or permanent lines. Sizes 1", 1¼", 2", 3", 4".

Style 77 & 77-D

VICTAULIC COUPLINGS **Style 75**

Style 77 & 77-D—The "general-purpose" couplings for standard applications. Simple, fast, reliable—sizes ¾" to 60".

Style 75—Light Weight Couplings—for low pressure, low external stress applications. Sizes 2", 3", 4".

VIC-GROOVER TOOLS

Handy, on-the-job grooving tools that do the work in half the time. Light weight, easy to handle, operate manually or from any power drive. Automatic groove position and depth. Sizes ¾" to 8".

VICTAULIC FULL-FLOW FITTINGS

Streamlined for top efficiency, easy to install—complete line, Elbows, Tees, Reducers, Laterals, etc., — fit all Victaulic Couplings. Sizes ¾" to 12".

FOR PLAIN END PIPE

Style 99
VICTAULIC ROUST-A-BOUT COUPLINGS Best engineered, most useful plain end joint on the market! Simple, fast, husky. Easy to install with any socket wrench. Takes strong, positive, bull-dog grip on pipe. Sizes 2" to 8".

Promptly available from distributor stocks coast-to-coast. Write for NEW Victaulic Catalog and Engineering Manual No. 54-8C.

VICTAULIC COMPANY OF AMERICA
P. O. Box 509 • Elizabeth, N. J.

EASIEST WAY TO MAKE ENDS MEET!

Since installation at Castle Dome, the plant has been expanded greatly. National Steel's work force will vary between 35 and 100 men and cost of equipment required to transport the mill will exceed $800,000 in value.

Sleeping Beauty site has been under preparation for several years. Some 8-million tons of waste have been removed to bare the ore body and foundations already are in for the mill and the crusher.

Sleeping Beauty has an expected yield of 32-million tons of copper as compared with Castle Dome's 40-million during its 10-year life.

ARKANSAS

Reynolds Metals Co.'s new Robert P. Patterson aluminum reduction plant near Arkadelphia is now in operation. The new $34-million plant has an annual rated capacity of 110-million lb of virgin aluminum. Its operation gives Reynolds an annual production capacity of 829-million lb.

J. W. Hutchison is plant manager. Pot rooms are 1827 ft long. Some 400 workers will be employed when the plant is in full operation.

Reynolds operates another reduction plant at Jones Mills in Arkansas' Hot Spring County. Alumina is supplied by a Reynolds plant at Hurricane Creek, Ark. Bauxite is mined by a subsidiary firm, Reynolds Mining Co., near Bauxite, Ark.

CALIFORNIA

Gossan gold ore is being treated at the rate of 100 tons a day at the cyanide plant put into operation last October at the Siskon mine, located on Dillon Creek in Siskiyou County. The ore is crushed to 60 mesh, then agitated in a cyanide solution for 48 hr. Gold is precipitated with zinc dust in a Merrill-Crowe filter plant. The ore is mined in an open cut with a power shovel.

In anticipation of heavy winter snows which halt mining, enough ore has been stockpiled to keep the cyanide plant operating for several weeks. The gossan gold ore was discovered while roads were being built in preparation for transporting equipment to prospect for sulfide ore.

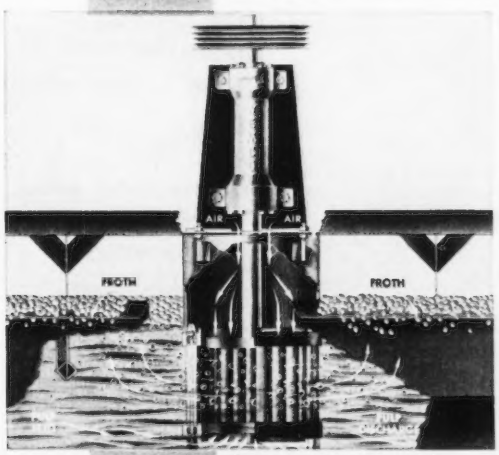
Only seven tungsten properties in the Sierra Nevada region are still in operation, according to a report just released by the State Division of Mines. Five major producers, which turned out 90% of the tungsten produced in Madera, Fresno and Tulare Counties before 1945, are Strawberry mine, Madera County; Garnet Dike, Fresno County; and Consolidated Tungsten, Tulare County Tungsten and Tungstore, all in Tulare County. It is estimated that these mines have reserves of about 93,000 units. Estimated reserves for the entire three-county area amounted to 126,000 units.

Homestake Mining Co., San Francisco, has purchased all the stock of Little Beaver Mining Co., which owns a uranium mine in southern Utah adjacent

THE NEW JERSEY ZINC COMPANY
uses
154 FAGERGREN FLOTATION MACHINES

Fagergren cells in flotation circuit at Austinville mill of The New Jersey Zinc Company.

Closeup view of Fagergren cells at The New Jersey Zinc Company installation.



Fagergren operating principle.

In recent years, an impressive total of 154 Fagergren Flotation Machines has been ordered by The New Jersey Zinc Company. A substantial number of these units are in operation at the Austinville, Virginia, and Hanover, New Mexico, mills with the balance to be installed at the company's new Friedensville, Pennsylvania, mill. The satisfactory operating results obtained with Fagergrens by this company in the treatment of zinc and lead ores — together with the many repeat orders received from other large operators — attests to the wide acceptance Fagergrens have among major producers of metallic and non-metallic minerals.

Along with these Fagergren units, New Jersey Zinc also has specified Wemco Conditioners for pretreatment of flotation pulps at its Gilman, Colorado, and Friedensville installations.

FAGERGREN SUPERIORITY RESULTS FROM THE EXCLUSIVE ROTOR-STATOR DESIGN

Higher percent recovery—because rotor-stator produces vast quantities of smaller, livelier bubbles with greater total mineral attachment area.

Greater capacity—due to more intense pulp aeration and circulation which results in faster mineral removal.

Less capital investment—greater capacity means fewer cells required to handle given tonnage, less floor space and lower installation costs.

Lower reagent cost—because of better aeration and high speed of flotation.

Lower operating costs—minimum maintenance and attendance required, high power intensity per cubic foot of cell volume.

Specify Fagergrens to step up flotation efficiency in your installation. Write today for free Fagergren Bulletin No. F-5-C-1.

WEMCO®
WESTERN MACHINERY COMPANY
760-766 FOLSOM STREET · SAN FRANCISCO 7, CALIFORNIA

Mobil-Mills • Coal Spirals • HMS Thickeners • HMS Pumps • Sand Pumps • Agitators Cone Separators • Drum Separators • Hydroseparators • Fagergren Laboratory Units Fagergren & Steffensen Flotation Machines • S-H Classifiers • Attrition Machines HMS Laboratory Units • Dewatering Spirals • Thickeners • Conditioners • Densifiers

PRINCIPAL OFFICES
San Francisco • Sacramento
Salt Lake City • Spokane
Denver • Phoenix
Chicago • Hibbing, Minnesota
New York • Birmingham
Toronto, Canada
Jeffersonville, Indiana

EXPORT DISTRIBUTORS
Fraser & Chalmers (S.A.) (Pty.) Limited
P. O. Box 619, Johannesburg, South Africa
Lilestone & Co., Inc.
P. O. Box 3368, Manila, Philippines
United Development Corporation Pty. Ltd.
P. O. Box 3460, Sydney, N.S.W., Australia
Corporation Commercial Sudamericana S.A.
Casilla 505, Lima, Peru
The Sumitomo Machinery Co., Ltd.
S-22 Kitahama, Higashi-Ku, Osaka, Japan

UST* Continental Idlers

*** UNIT-SEALED PRE-LUBRICATED TIMKEN BEARINGS**

Saves Grease!
Saves Labor!
Saves Belts!

UNIT-SEALED
PRE-LUBRICATED
TIMKEN BEARINGS

Continental's Unit-Sealed "UST" Conveyor Idlers, incorporating Timken Bearings, Garlock Klozures, are the answer to the operator's prayer.

The Unit Bearing Assemblies—"sealed unto themselves" provide an ample but not excessive grease reservoir. This represents a saving of grease and further eliminates any possible migration of the grease from upper to lower bearings on inclined rolls. The lubricant is a top quality water repellent grease of a stable consistency with a wide temperature range for long life.

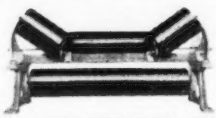
Most important—this construction permits operating the Continental "UST" Idler without relubrication for 1-2-3 years depending upon the severity or character of conditions.

For detailed information on these idlers write for Bulletin SI-116.

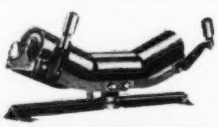
STANDARD DUTY IDLER

SELF-ALIGNING FLAT BELT IDLER

RUBBER DISC IMPACT IDLER



GRAIN CONCENTRATION IDLER



SELF-ALIGNING TROUGHING IDLER

Long Life- THE ULTIMATE IN MINIMUM MAINTENANCE

CG—5209

INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA

ENGINEERS CGC ATLANTA • DALLAS • MEMPHIS • NEW YORK CGC MANUFACTURERS

California *(Continued)*

to the claims of Charles Steen. Purchase price was $1,560,000, according to Donald H. McLaughlin, Homestake president.

Homestake, whose major interest is a gold mine at Lead, S. D., already is entrenched in the uranium field. It owns uranium mines in North Dakota, South Dakota and southeastern Wyoming.

McLaughlin said drill holes prove the occurrence of ore on the Little Beaver property but underground access to the drilled area is necessary before its ultimate importance can be known.

The purchase agreement calls for capital stock of Little Beaver and certain other documents to be deposited in escrow, after which Homestake will make a down payment of $60,000 on the purchase price.

COLORADO

A small crew is installing a compressor at the Golconda tunnel on Fall River for uranium prospecting. Atomic Energy Commission is expected to finance work as a part of the Commission's undertaking to study the geology of uranium-bearing ores in the front range mountain area. Ed Price, Idaho Springs mining engineer, is in charge of the work at the Golconda.

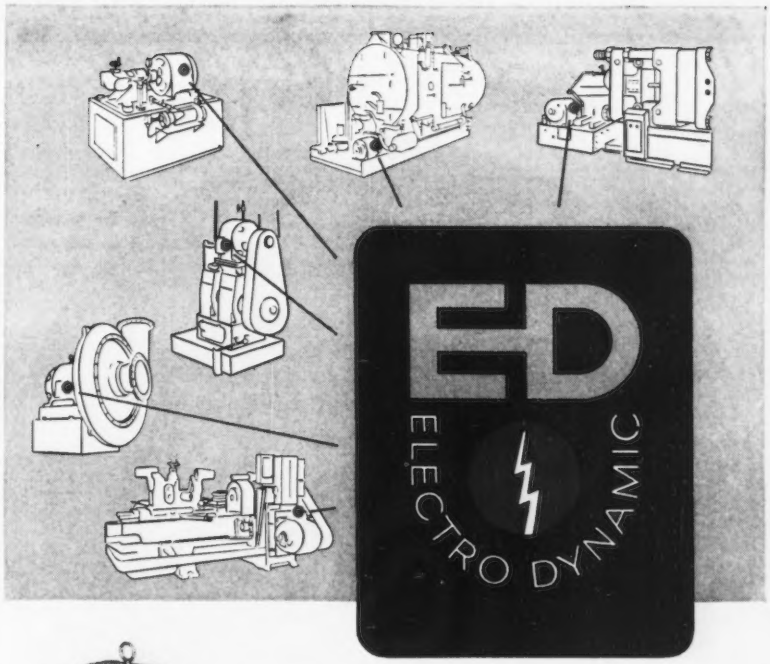
Hunt Oil Co. of Dallas has leased a 5200-acre uranium tract at the west end of Disappointment Valley, about 20 mi north of Dove Creek. The oil company plans to start a $250,000 drilling operation in the area.

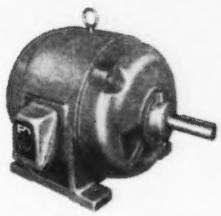
The West's gold mining industry has recovered to the extent of pushing receipts at the Denver mint in 1953 up to the highest level since 1942. Gold is received here from western states and Alaska.

Mint officials reported that receipts for last year came to 919,450 oz worth $32,180,702, compared with 805,917 oz worth $28,207,121 in 1952. Receipts in 1942 were worth $47-million and in 1941 were valued at $69-million. Silver receipts in 1953 were up to 2,854,187 oz worth $2,581,866, from 2,459,674 oz worth $2,225,018 in 1952. Number of shipments received was up to 4,135 from 3,904.

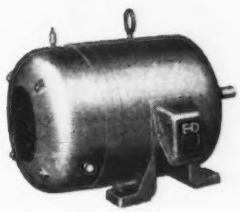
Gold receipts for December were up to 74,597 oz worth $2,610,917, from 70,469 oz worth $2,466,449 in 1952. Silver receipts down to 133,536 oz worth $120,754, from 304,624 oz worth $275,688 with number of shipments down to 198 from 420.

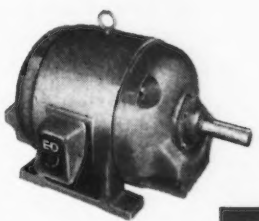
Cresson mine at Cripple Creek has leased out the Gold Sovereign Mine to a new company, The Gold Sovereign Mining Co., which was organized late in 1953. Extensive repairs have been made on the surface plant with the installation of a new steel gallows frame and hoist house and the installation of the hoist equipment. Plans are to retimber the upper 300 ft of the shaft before actual operation can be started. R. W. Johnson heads the operation with Charles Chapman, Sr., as superintendent.





THIS EMBLEM IDENTIFIES EXTRA DEPENDABLE INDUSTRIAL MACHINERY





The red *power spot* on industrial machinery means "Powered by Electro Dynamic." Such machinery relies with confidence on the *extra dependability* of Electro Dynamic motors, the proven industrial motors which give industrial equipment *extra dependable* operation.

Conclusive evidence of the *extra dependability* of Electro Dynamic motors is now revealed in the new candid report **"MOTOR SHOWDOWN"**. The revealing proof is found in *comparative tests** conducted in accordance with A.I.E.E. standards. Don't miss your copy! Send the coupon below *today*.

*Tests certified by J. Arthur Balmford, Professor of Electrical Engineering at a leading Eastern university.

1 to 250 hp. AC and DC. Standard or special purpose. N.E.M.A. standards.

ELECTRO *xtra* **DYNAMIC** *ependable motors*

ELECTRO DYNAMIC • ***Division of General Dynamics Corporation***
156 Avenue A, Bayonne, New Jersey

Please send me a copy of "MOTOR SHOWDOWN" and the new catalog of Electro Dynamic industrial motors.

ED MOTOR SHOWDOWN

NAME_____

COMPANY_____

ADDRESS_____

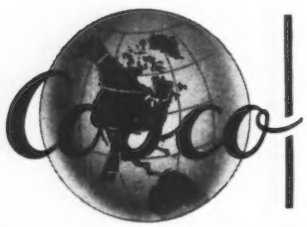
On top—or underground

Copco men

KENNY AVERILL
Boulder, Colorado

Pick most any mining area on the North American continent—and chances are a COPCO man is there, right now. Up top at the office maybe, but just as often down below. For COPCO field men . . . drill specialists of course . . . are experienced miners too! They will prove to you and your crew exactly how their justly-famous product team, lightweight Atlas Rock Drills and guaranteed-quality Coromant Drill Steels, will reduce your cost per ton.

Ask the COPCO office nearest you for a demonstration right on your property. No obligation of course.



PACIFIC Ltd.
930 Brittan Avenue—San Carlos, Calif.

EASTERN Ltd.
250 Park Avenue—New York 17, N. Y.

MEXICANA S.A.
Ave Juarez y Calle Comonfort
Torreon, Coahuila, Mexico

BRANCH OFFICES AND WAREHOUSES THROUGHOUT NORTH AMERICA

Colorado *(Continued)*

Testing was done in 1953 on placer ground in Galena Gulch near Alma on the Swan by Harry O. Nylene of Leadville. Nylene has a lease from the Natomas Co. on this ground and plans to move in a plant for the operation this spring. The plant will be located on top of the dredge pile near the pond at the mouth of Galena Gulch. Gravel will be hauled in trucks from the workings south of the road in Galena Gulch. Preliminary testing of the area indicates recoveries of about 20 oz of gold a day.

LeClair Mining Co. at Cripple Creek undertook renovation of the Grace Greenwood last year and have the machinery and building back in A-1 operating condition. Operations were brought to a temporary halt a short time ago when they broke into some old workings and were flooded out. The water has been removed and shipping of a lot every other day has been resumed.

Walter E. Scott, Jr., commissioner of mines for Colorado, has issued a preliminary report covering estimated Colorado metal production for 1953 as follows: Molybdenum $37,200,000, tungsten $1,111,550, beryllium $156,000, tin $20,000, miscellaneous $1,100,000. Uranium mining and processing with vanadium by-products, estimated value to State as $75-million.

Deeds were recorded at Lake City transferring title of the Ute and Ulay Mining Co. properties from Colorado Standard Lead Zinc Mines, Inc., to the Idarado Mining Co., one of the nation's largest producers of lead and zinc. The ore also carries gold, silver and copper. The mine has a 100-ton flotation mill. Idarado took a lease on the property a year ago, with an option to buy and worked the mine for several months.

An exploration program centered in historic Iowa Gulch constitutes most of the present work of the Resurrection Mining Co. at Leadville. Exploration of Iowa Gulch property, Morton McKay, manager, was pushed after the results of diamond drilling last summer proved encouraging. The collar of the Helena shaft has been repaired and a headframe has been erected. Hoistroom facilities have been installed and the shaft has been pumped out to the 500-ft level. Pumping is continuous and is being maintained at the rate of 650 gpm. Current work consists of laying track on 500-ft level.

A uranium strike which Atomic Energy Commission characterized as "significant" has been made on the eastern slope of Colorado's Continental Divide by a 58-year-old man who only a few weeks ago was employed as a janitor.

The man, Fred Schwartzwalder, already has sold one carload of "good ore" from his strike 8 mi northwest of Golden. The ore was sold through AEC for shipment to Vitro Chemical Co., Salt Lake City.

For 30 years, Schwartzwalder has been a part-time rockhound. Three years ago he made his strike. Working on week-

FAST, COMPLETE SEPARATION

Dow Xanthates

Assure maximum recovery, and minimum cost in the flotation of sulfide minerals.

Increased recovery and improved concentrate grade show up immediately when Dow Xanthates go to work in your mill. This has been proved in mills all over the world where these superior Dow collectors are improving metallurgy and saving dollars.

These Xanthates permit greater freedom in regulating frother and collector independently because they are reliable collectors but substantially nonfrothing.

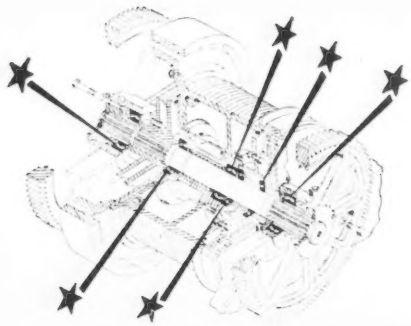
For a quality frother, however, give Dowfroth® 250 a trial. It builds hard-working froth with reduced consumption.

To learn more about the quality flotation agents, Dow Xanthates and Dowfroth 250, write us for information and test samples. THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. OC 835H.

you can depend on DOW CHEMICALS

LIMA'S

shafts and drums roll on anti-friction bearings



STARS INDICATE LOCATION OF ANTI-FRICTION BEARINGS IN DRUMS AND PILLOW BLOCKS

As a result of twenty-five years' experience with anti-friction bearings, Lima design engineers know exactly where to put them to give you maximum benefits. This cut away view shows how Lima utilizes anti-friction bearings in the drums. X-ray vision would show you how Lima uses them throughout the main machinery on all shafts and other important parts.

This modern means of eliminating destructive friction benefits LIMA owners through faster operating speeds and lower upkeep. Anti-friction bearings also maintain perfect shaft alignment and insures smoother, easier clutch action.

LIMA Type 2400 Shovel, equipped with 36' boom, 27' dipper handle, 6 cu. yd. dipper.

COMPARE! No other machine gives you as much as LIMA!

1. Bronze bushings in tread, idler and drive rollers are protected by piston-type dirt seal rings and retainers.
2. All gears, smaller parts and shafts which are subject to extra wear are flame or induction hardened for longer life.
3. Main machinery is placed well back of center of rotation to eliminate excess counterweight.
4. Anti-friction bearings, used at all important bearing points, reduce destructive friction, fuel consumption and lubrication requirements.
5. Big capacity drums and sheaves lengthen cable life by reducing the need for double wrapping and sharp bends in cable.
6. Full air controls on travel, hoist, swing and boom hoist, result in smoother, more precise operation, minimum maintenance and less operator fatigue.
7. Torque converter (optional) automatically adjusts speed to load requirements, minimizing shock loading, making performance smoother and faster.
8. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts to keep your LIMA on the job continuously.

COMPARE and you'll specify LIMA for shovels (¾ yd. to 6 yds.), cranes (to 110 tons) and draglines (variable). Smaller capacities available on rubber.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA

SHOVELS • CRANES
DRAGLINES • PULLSHOVELS

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

BALDWIN-LIMA-HAMILTON CORPORATION
Construction Equipment Division
LIMA, OHIO, U.S.A.

Colorado *(Continued)*

ends and vacations away from his job as janitor of Golden High School, he shoveled alone. With one carload assured, he resigned his janitor's post last Dec. 31.

He now has two miners working for him on another carload.

Ute Uranium Inc. has signed a contract with Johnson & Yauvan, Naturita contractor, for 7,500 ft of core drilling on Ute property in the Bishop Canyon area in southwest Colorado, according to F. W. Ferguson, mayor of Cripple Creek, and president of Ute.

The company holds leases on three groups of claims, covering over 1000 acres along the Colorado-Utah border. Exploratory drilling and all mining operations will be directed by Ferguson. Roy Hunt is now opening a road to the Ute Company's Bishop Canyon group of properties, which adjoin the Strawberry Roan mine owned by Vanadium Corp. of America.

IDAHO

Calera Mining Co., subsidiary of Howe Sound Co., has resumed full operations at its Blackbird cobalt-copper mine in Lemhi County, following conclusion of an agreement under which Chemical Construction Corp., subsidiary of American Cyanamid Co., will operate the new cobalt refinery at Garfield, Utah, for two years on a custom basis (see Utah news).

The big Blackbird Mine, readied for 1000-ton per day operation more than a year ago, has been operating on a limited scale since January 1953, because of production difficulties at the Garfield plant. Employment at the mine will be more than doubled, from 130 men to 270, within the next three months, officials said.

The Calera firm has also been granted 70% federal loan assistance by the DMEA on a $407,340 program of exploration for additional cobalt-copper deposits in the vicinity of the Blackbird Mine. Both surface and underground exploration will be undertaken during the next two years under the contract.

Clayton Silver Mines' mining and milling operation in the Bayhorse District of Custer County continued to show a profit in 1953 in spite of low metal prices. Production totaled 34,000 tons, leaving about three years supply of ore broken in stopes above the 400 level.

Shaft deepening has been completed and preparations for opening a new 550 level are in progress. The new level will gain 170 ft of depth on the ore shoots and is expected to open reserves sufficient for an additional five to seven years of operation.

Mill output last year averaged slightly more than three cars of lead concentrates a month, containing 60 to 63% lead and about 90 oz of silver per ton. Zinc was produced only when heads were high

(Continued on p 138)

THE PRESIDENT GETS GOOD NEWS

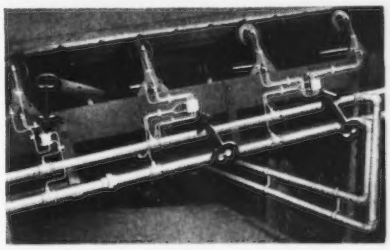
"Farval doubles delivery, saved $60,000, too"

IN a plant with 110,000 feet of coal conveyors, four hand-oilers per shift were employed to lubricate 650 bearings. But there was constant trouble. Between oilers' visits, bearings frequently heated up and failed. Reducing speed to 300 feet a minute was tried. But that slowed coal delivery.

At the suggestion of the president, the superintendent looked into—and installed—26 Farval Centralized Systems of Lubrication. Farval eliminated the trouble. Conveyor speed was stepped up to 600 feet a minute. No bearings burned out. Coal delivery doubled! And it takes only 2 men to look after the Farval systems. "In 5 years," says the plant superintendent, "the saving in labor comes to $60,000."

Farval is the Dualine system of centralized lubrication that hydraulically delivers oil or grease, exactly measured, to each individual bearing on a machine as often as desired.

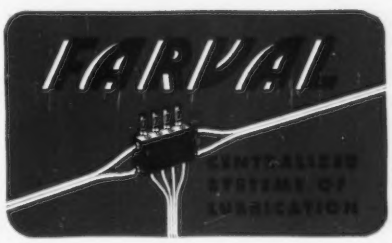
FREE LUBRICATION SURVEY—Without obligation, let us send one of our lubrication engineers to inspect your plant equipment and present a written analysis of what Farval can do for you. The savings possible will amaze you! Just mail the coupon or write us a note.



KEYS TO ADEQUATE LUBRICATION—Wherever you see the sign of Farval—the familiar valve manifolds, dual lubricant lines and central pumping station—you know a machine is being properly lubricated.

Above is one of the conveyor drive units now protected by Farval. Farval lubricates while equipment is running—saves shutting down to oil. Top: Superintendent shows the president how Farval works—pump, lubricant lines and Dualine valves which guarantee delivery of a measured amount of lubricant to every bearing.

Farval is an affiliate of The Cleveland Worm & Gear Co. Represented in Canada by Peacock Brothers, Limited.



The Farval Corporation, 3281 East 80th Street, Cleveland 4, Ohio.

Send Farval Bulletin 26 and details of your free lubrication survey.

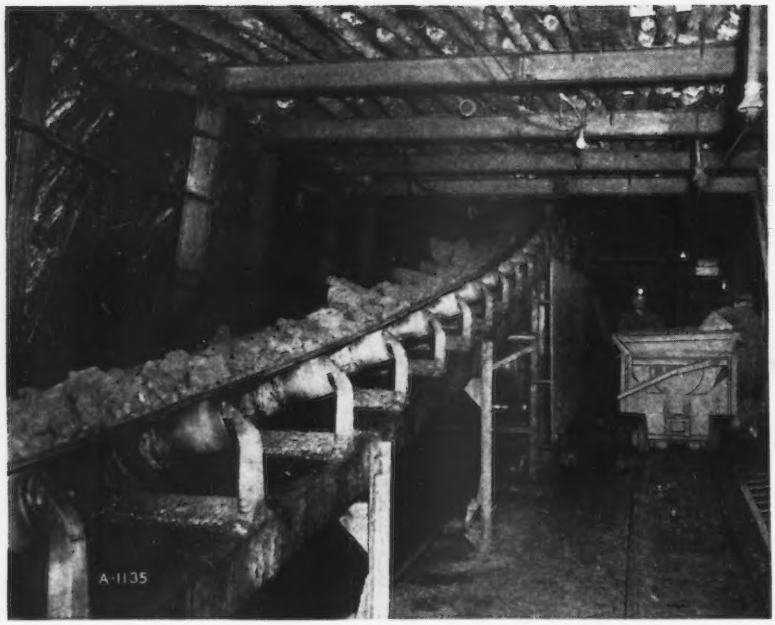
Name_____

Title_____

Company_____

Street_____

City_____ State_____



1200 FEET UNDERGROUND, iron ore moves to skip pocket on this S-A belt conveyor. S-A "Simplex" carriers have proven more than able to withstand the heavy loads and shocks of this operation. With an annual tonnage of about 300,000, this Menominee Range Mine in Michigan shows that the economies of underground haulage by belt conveyor are not limited to the handling of huge yearly tonnages. Additional conveyor flights are planned to complete the system.

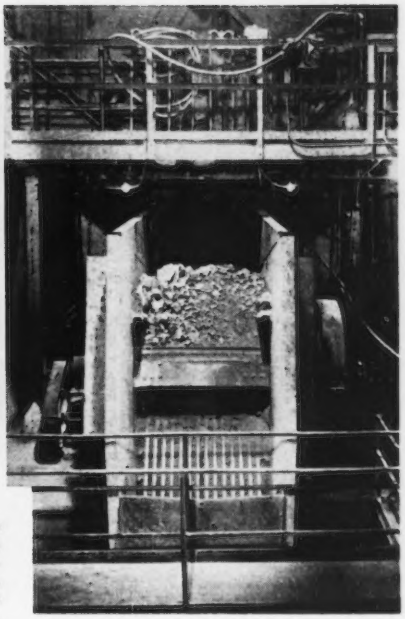
Low Cost Ore Handling Calls for Various Types of Conveying Equipment

When an S-A Conveying Engineer makes his recommendation, his choice of equipment is unlimited! This permits him to specify the type of system or equipment that will do any particular job most efficiently and economically. Drawing upon a complete line that includes every type of bulk materials handling equipment, he can be completely impartial.

What's more, he is backed by an engineering staff whose more than 50 years of experience covers just about every imaginable ore handling problem.

Whether or not *your* conveying needs are similar to any of those illustrated here, the chances are S-A has already met and solved a bulk handling problem *like* yours. Why not find out how we can help you by asking for a free survey. There's no obligation of course.

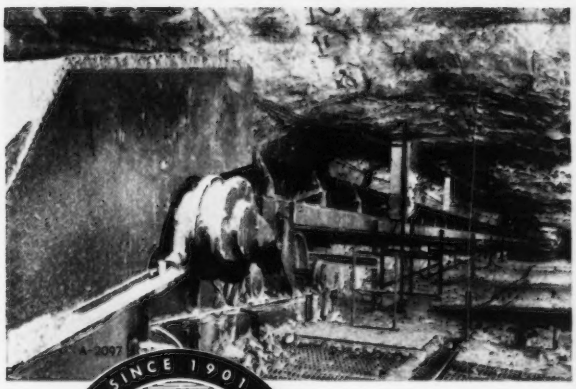
OVER 120 MILLION TONS of copper ore have been handled since 1939 by this 1412-foot S-A belt conveyor in Chile. The conveyor is still going strong, moving ore at the rate of 4800 tons per hour. More than 2500 S-A "Mammouth" and style "444" belt carriers have been in operation at this plant for more than a quarter of a century. All of them are in the multi-million ton class! In all, more than six miles of conveyor belts ride on S-A carriers at this plant.

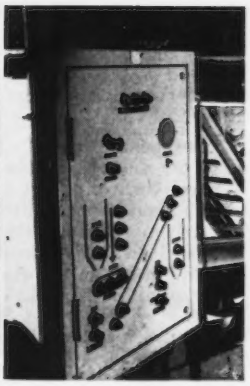


DOUBLE-DUTY S-A CONVEYING SYSTEM handles two kinds of ore in alternating runs at this British Columbia mine. An S-A "AMSCO" plate feeder (see inset) receives lead-zinc ore from the chute at right, tungsten ore from the chute at left. Both ores are then carried by S-A belt conveyors to a transfer point outside the mine. Tungsten ore is shunted to another belt conveyor and carried to the tungsten mill. Lead-zinc ore is taken by a series of conveying flights to a mill in the valley. This system has eliminated the use of an aerial tramway and a fleet of trucks.

MORE THAN 4,000,000 TONS OF CRUSHED COPPER ORE

have been handled since 1948 by this S-A "AMSCO" feeder and belt conveyor system in Arizona. The crushed ore drops 62 feet from the primary crusher to the heavy-duty manganese steel feeder. It is then discharged to an S-A belt conveyor which carries it to storage bins. Above the bins an S-A traveling tripper discharges the belt, insuring uniform loading of the bins. The system handles an average of 700 tons of ore per hour.





AUTOMATIC "TRAFFIC CONTROL"

on this S-A conveying system helps move potash ore in high volume 900 feet underground near Carlsbad, N. M. An electric control system complete with panel that flashes a full picture of the conveying operation, makes sure that no unit feeding another can operate under load unless the unit ahead is running.

SINCE 1901 S-A STEPHENS-ADAMSON MFG. CO.

STEPHENS-ADAMSON MFG. CO.

4 Ridgeway Avenue, Aurora, Illinois • Los Angeles, Calif. • Belleville, Ontario

Engineering Division

Specialists in the design and manufacture of all types of bulk materials conveying systems.

Standard Products Division

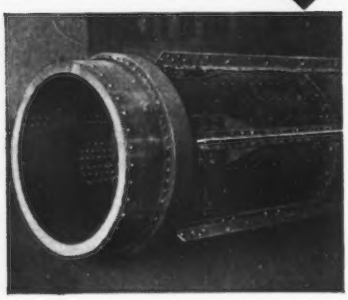
A complete line of conveyor accessories including centrifugal loaders—car pullers—bin level controls—etc.

SealMaster Division

A complete line of industrial ball bearing units available in both standard and special housings.

for dredges
and washing plants

flat undercurrent and round Trommel screens



made to your order by

YUBA

Accurately cut and drilled from U.S. Steel Abrasion Resisting plate to fit your exact job requirements. All thicknesses from 3/16". Other dimensions as big as your needs. Holes taper-drilled, unless straight sides requested. Hole sizes ¼" diameter or larger. Any hole spacing from one diameter or greater.

All YUBA screens are cut square to close limits and rolled true to insure proper fit and fast installation. Quick delivery from ARS plate in stock. Competitively priced. Sketches submitted for your approval on request.

For estimates and recommendations, wire, write or phone TODAY.

69

YUBA DREDGES — PROVED DEPENDABILITY AROUND THE WORLD

YUBA MANUFACTURING CO.
Room 706 • 351 California St. • San Francisco 4, Calif

Idaho *(Continued)*

enough to warrant operation of the zinc circuit and instead of shipping the zinc the company stockpiled it in anticipation of a higher price at some future date.

New Rainbow Mining Co. has encountered mineable ore in the process of cleaning out and rehabilitating old workings on the No. 4 level at the old Weber Mine in the Lakeview District of Bonner County. A cave-in of the tunnel roof exposed the ore along the hanging-wall of the vein. Old timers who drove the original drift evidently missed it by staying along the footwall of the structure.

One channel sample over a 3-ft width assayed 32.6 oz of silver per ton and another, taken 8 ft farther along the vein across a 5-ft width, assayed 57.6 oz.

The drift has now been turned to get on the ore and is being continued east toward an orebody which, according to old maps, lies about 75 ft ahead.

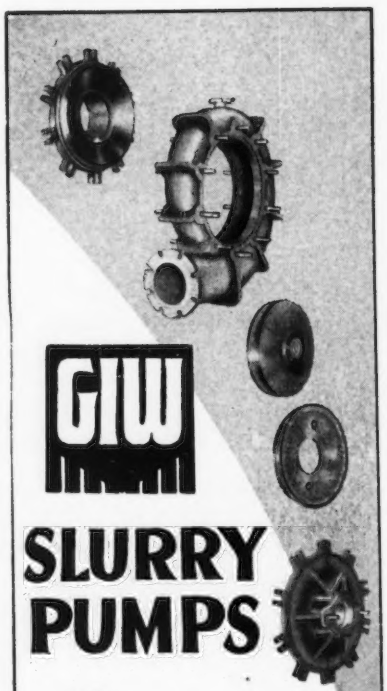
Effective Feb. 1, practically all lead-zinc operations in the Coeur d'Alene Mining District, including the Bunker Hill lead smelter and the Sullivan electrolytic zinc plant, went on a 5-day, 40-hour week in an effort to curtail production and reverse the trend of mounting stocks in the hands of producers. Bunker Hill and Sullivan Mining and Concentrating Co., was the first to announce the cut-back, effective at its big mine and mill as well as the smelter. Similar announcements came shortly from American Smelting and Refining Co., Day Mines Inc., Sullivan Mining Co. (Star Mine at Burke), Sidney Mining Co., and Spokane-Idaho Mining Co.

Approximately 3000 men will be affected by the work-week curtailment.

Only Sunshine Mining Co. and Polaris Mining Co., both primarily silver producers, will stay on the six-day, 48-hr week which has been in effect in the district since 1949. Another exception is American Smelting and Refining Co.'s Jack Waite Mine on the Idaho-Montana border northeast of Wallace. Although a lead-zinc producer, the operation will be continued on six days because of its isolated location.

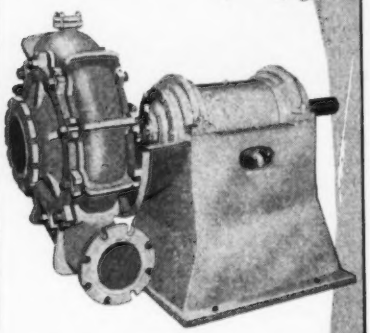
Sunshining Mining Co. has opened a new ore shoot about 250-ft long on the Yankee Girl No. 2 vein which lies south of the main Yankee Girl structure on its westerly extension into the Sunshine Consolidated area. Development ore from the drift and from a 75-ft raise which has been run on the ore has averaged about 45 oz of silver per ton. One stope has been started and others are in process of preparation.

An accelerated program of development work has been in progress in the Sun Con area for several months. The 2700-ft level west drift on the main Yankee Girl vein has been extended considerably and a raise in the No. 96 stoping area is expected to hole through to the higher horizon shortly, thus greatly improving ventilation in the westerly workings. Plans for opening the new ore body on the 2700 level and for



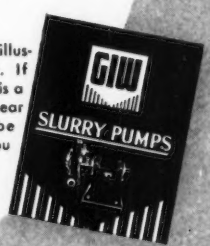
GIW

SLURRY PUMPS



The performance of these pumps is remarkable. Their stamina and efficiency are documented by two years of laboratory and field tests. This is the happy answer to the problem of pumping highly abrasive slurries at high solid concentrations and over a wide range of heads and capacities. Their capacities range from 50 to 8000 GPM against heads up to 150'.

Write for our illustrated booklet. If you wish, there is a representative near you who will be glad to call if you desire.



GEORGIA IRON WORKS CO.
Marbury Street, Augusta, Ga.

GM DIESEL
CASE HISTORY NO. 5310-1X

OWNER: American Zinc Company, North Friends Station Mine, Mascot, Tenn.

INSTALLATION: GM 4-71 Diesels powering 3 Koehring Dumptors. Units haul 8¼ tons of rock and ore on 1100-foot run up 11½% grade to surface.

PERFORMANCE: GM Diesel-powered units help 20-man crew produce 500 tons of ore per day. Use of rubber-tired equipment cut cost of access shaft construction by 70%.

GM
GENERAL MOTORS
DIESEL POWER

GM DIESELS GO UNDERGROUND

to make trackless mining pay

One of the world's most efficient small underground mines, the American Zinc Company's new North Friends Station mine is proving the economy of trackless operation. With a fleet of three GM Diesel-powered Koehring Dumptors handling the haulage, the mine is producing 500 tons of ore per day—about 25 tons of ore per man-shift. Mine Foreman Bill Armstrong says: "These units run along month after month with almost no repairs. Our costs are much less than we expected."

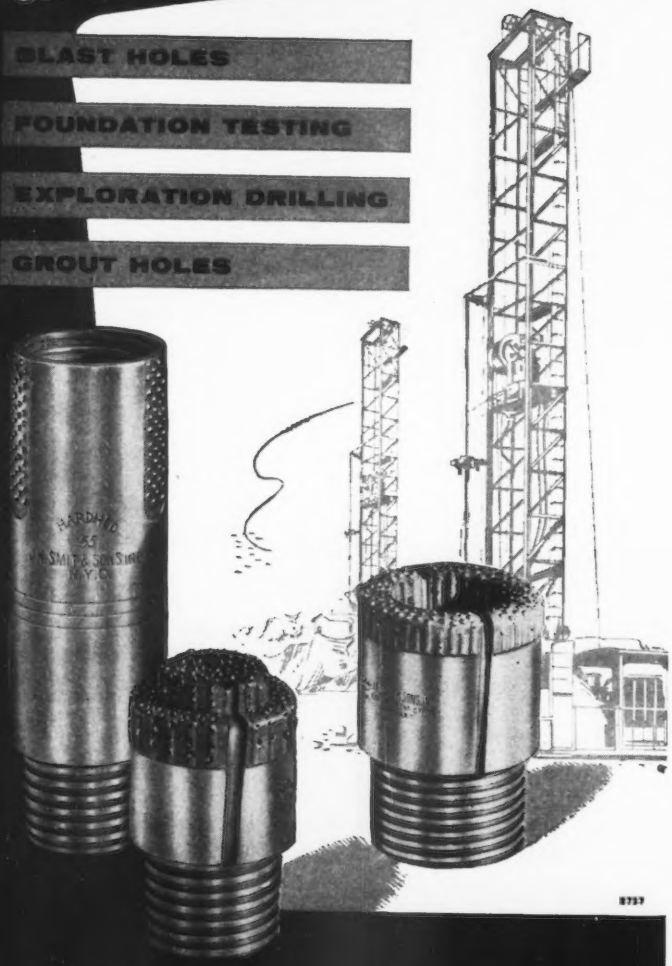
General Motors 2-cycle Diesels are just as much at home underground as on the surface. Two-cycle operation with uniflow blower scavenging gives more complete combustion of low-cost fuel for higher efficiency and cleaner exhaust. Used with exhaust scrubbers and adequate ventilation, mine air stays well within permissable limits. And two-cycle operation means faster acceleration, quicker response to controls, faster haul cycles for increased production.

There's a GM Diesel for every kind of mining job. Specify GM Diesel power in *your* equipment. It will save you money.

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Units... 16 to 275 H.P. Multiple Units... Up to 840 H.P.

3 good reasons why you can depend on JKS Diamond Drill Bits

for BLAST HOLES
FOUNDATION TESTING
EXPLORATION DRILLING
GROUT HOLES



1. Proven designs in three distinct powdered metal matrices for various drilling conditions.
2. Careful grading and selection of diamond quality and size to meet all conditions.
3. Dependable delivery.

J. K. SMIT & SONS, INC.
MURRAY HILL, NEW JERSEY
Other Plants in:
LONDON, PARIS, AMSTERDAM, and TORONTO, CANADA

Idaho *(Continued)*

raising to establish an intermediate 2900 level on it are under consideration.

Curtailments and shutdowns at lead-zinc properties in the Coeur d'Alene District during 1953 because of low prices of these metals proved to be a substantial benefit to Sunshine Mining Co., the nation's largest silver producer. The improved labor supply situation enabled the company to increase its output to 249,686 tons, 12% above 1952 and the highest since 1950.

Employment at the year-end totaled approximately 600 men, of which about 425 were underground workers. This compared with 375 underground workers a year earlier. Many of the additional men were hired when the big Morning mine at Mullan, American Smelting & Refining Co. operation, closed last October.

Value of Idaho's mine production of gold, silver, copper, lead and zinc declined 26% in 1953 to $47,670,842, according to preliminary estimates prepared by the Bureau of Mines. Low lead and zinc prices were largely responsible for the drop.

Zinc output was down 44% in value to $13,740,104; lead production down 20% to $18,768,960; and gold off about 42% to $699,200. The value of silver production declined only slightly to $12,896,698 and the value of copper output, $1,595,880, was actually slightly higher than in 1952 despite a decline in tonnage, because of the higher price last year.

Tonnagewise, Idaho's production of the five metals in 1953 was as follows, with 1952 totals in parenthesis: Zinc, 63,028 tons (74,317); lead, 70,565 tons (73,719); gold, 19,120 fine ounces (32,997); silver, 14,249,700 fine ounces (14,923,165); copper, 2,790 tons (3,213).

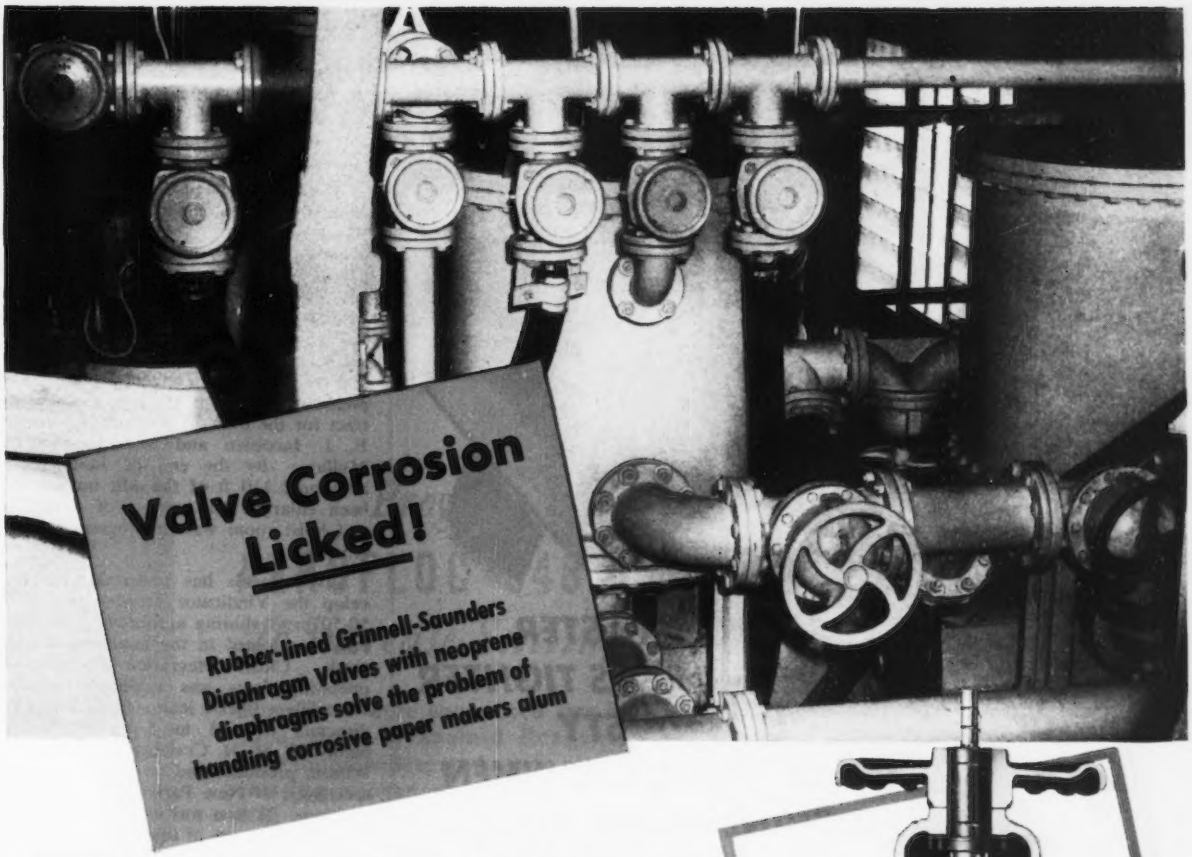
Despite the production declines, Idaho continued to lead the nation in silver output and ranked second in production of lead and zinc.

Operation of Spokane-Idaho Mining Co.'s Constitution Mine, on upper Pine Creek in the Coeur d'Alene District, under the incentive block-leasing system has resulted in an increase of 15% in production per man-shift and a boost of 67% in mill-heads.

The system was introduced at the mine last March and since May the entire mine, from the adit level to the 1800 level, has been operated under the plan. Six leasing groups, employing 23 men, are now responsible for all production. The company employs an additional 23 men in the mill and other surface installations.

Production now averages about 2500 tons per month, as against 3500 tons with a crew of 85 men before the system was inaugurated. Mill-heads range from 10 to 23% combined lead and zinc, compared with an average of about 11% previously. In addition the ratio of lead to zinc has been improved materially. Income of leasers is averaging about $33 per day.

The system was introduced at the Spokane-Idaho property by Brower

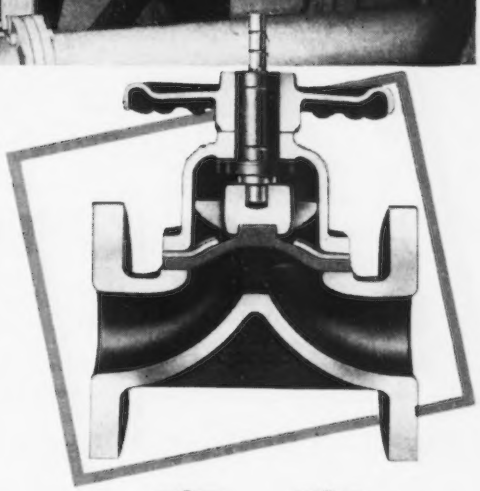

Valve Corrosion Licked!
Rubber-lined Grinnell-Saunders Diaphragm Valves with neoprene diaphragms solve the problem of handling corrosive paper makers alum

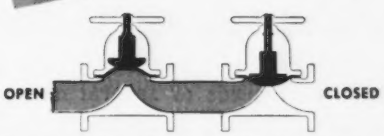
GRINNELL-SAUNDERS DIAPHRAGM VALVES

Commercial aluminum sulphate can be everlastingly troublesome, as anyone knows who has ever had to work with it. That's why in the manufacture of "paper makers alum" the preference is for Grinnell-Saunders Diaphragm Valves. In fact, the wide range of body, lining and diaphragm materials available with Grinnell-Saunders valves offers flexibility in handling a wide variety of corrosive fluids.

The basic design of the valve is an advantage. Working parts are completely isolated from the fluid stream which, in the case of corrosive acids, means longer valve life. Also, there is the matter of economy. With Grinnell-Saunders Diaphragm Valves, it is usually possible to go to less expensive body materials, to which special linings can be added. Replacement and maintenance costs, moreover, are greatly reduced.

Orginally designed and ideally suited for air and water service, Grinnell-Saunders Diaphragm Valves also are recommended for almost every regular or special service. This is backed up by the excellent performance records achieved by valves now in use.





Features of Grinnell-Saunders Diaphragm Valve:

- Diaphragm absolutely isolates working parts from fluid
- Diaphragm lifts high for streamline flow in either direction
- Diaphragm presses tight for positive closure
- Body, lining and diaphragm materials to suit service
- Simple maintenance — diaphragm easily replaced without removing valve from line

GRINNELL
WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

SAFER • FASTER
CHEAPER • PACKS TIGHTER
LESS DUSTY
MORE UNIFORM WHEN MACHINE-MADE by the

BONNOT TERRIER

Capacity 2500 to 12,000 lineal feet per 8 hour day—or equivalent in sizes up to 6 inches or more.

Over 1,000,000 feet of stemming made daily on Bonnot Machines

- In some localities, a **central stemming plant** serves largest needs of several mines
- Mines usually **have suitable plastic earth** for economical machine-making
- Machine-made clay stemming **retains useful characteristics for days** with no more than ordinary care—**eliminates cost and bother** of paper-wrapped rock dust
- MEET ALL LEGAL REQUIREMENTS WHEN PROPERLY USED

Get complete details from

THE BONNOT CO.
CANTON 2, OHIO

Manufacturers of Equipment for Chemical • Steel • Ceramics • Hydraulics • Materials Handling Industries

Idaho *(Continued)*

Dellinger who took over as general manager in mid-1952. He had had considerable experience with it previously at the big gold operations in Grass Valley, Calif.

A $229,500 defense minerals exploration project to explore the Vindicator Silver-Lead property east of Mullan to a depth of 800 ft got underway in January as a joint operation of Silver Buckle Mining Co. of Wallace and New Park Mining Co. of Salt Lake City.

Preliminary rehabilitation work—relaying of track and air and water lines and readying surface facilities—was completed within about 10 days and a contract for the over-all program was let to E. J. Jacobsen and Michael Ban of Mullan. By the end of January an additional 110 ft of the adit tunnel had been enlarged and cutting of a station and hoist room was in progress, it was reported.

Silver Buckle has undertaken to develop the Vindicator property under a 50-50 profit-sharing agreement and New Park has joined in the financing of the work. Closer integration of the two operating firms was achieved recently when Silver Buckle increased its board of directors from 3 to 5 members and named W. H. H. Cranmer and Clark L. Wilson, president and vice president, respectively, of New Park, to fill the new positions. Wilson was elected vice president and manager of operations of Silver Buckle. He is directing the Vindicator project, with Gale A. Hanson of Salt Lake City in charge as superintendent of Silver Buckle operations.

Lookout Mountain Mining & Milling Co. has reported intersection of a 20-ft quartz-siderite vein structure in the southerly crosscut which is being driven into its property from the 1200-ft level of the Sunset Minerals shaft. Mineralization included pyrrhotite iron with small amounts of galena and chalcopyrite, but no zinc mineral. Further exploration of the structure by drifting will be undertaken after the crosscut has been extended to the projected position of a lead vein which yielded high-grade ore on upper levels. The crosscut is being run by Sunset Minerals, Inc., under signed contract.

Six Kellogg mining companies have entered into a joint uranium exploration venture on two adjoining properties in the booming Big Indian District of San Juan County, Utah. The companies are Silver Bowl Inc., Coeur d'Alene Silver Giant Inc., Nancy Lee Mines Inc., New Era Mines Inc., Caledonia Silver-Lead Mining Co., and Signal Mining Co.

The joint venture will be on the 30-claim "Hot Rock" group and the smaller adjoining "Radon" group, which lie roughly 12,000 ft northwest of the spectacular Utex Mine and next to the La Sal Mining Co. property where drills recently cored high-grade uranium ore.

A geological survey of the claim is now in progress and core drilling, as warranted, is scheduled to be started this spring.

Cyanamid REAGENT NEWS

Progress Report on the use of

AEROFLOC® 548 AND 552 REAGENTS

to Increase Settling and Filtration Rates

Since they were announced late in 1953, these Cyanamid Reagents have found widespread use in plants treating manganese, tungsten, iron, lead-zinc, gold, molybdenum, fluorspar, cobalt, as well as coal.

Effective, economical flocculating agents, AEROFLOC Reagents provide increased settling and filtration rates on finely-divided solid suspensions. Typical operating and efficiency benefits include:

Non-Sulphide Circuits: Due to inadequate thickener capacity, thousands of pounds of mineral values were being lost daily in thickener overflow. Addition of 0.04 lb. AEROFLOC 552 per ton of dry solids reduced this loss to less than 1% of former figure.

Cyanide Plants—countercurrent decantation: Addition of 0.02 lb. AEROFLOC 548 per ton of dry solids resulted in thickener underflow density of 42% solids and a clear overflow as compared with 25% solids and a dirty overflow previously.

Lead-Zinc Circuits: Zinc flotation concentrate thickener carried up to two feet of tough, matted froth, unbreakable by water sprays. Addition of AEROFLOC 548 flocculated mineral particles in the froth so that water sprays could readily dissipate it.

Sulphide Circuits: Addition of 0.15 lb. AEROFLOC 548 per ton of dry solids to flotation concentrate thickener discharge increased filtration rate 125% on a particularly slow-filtering concentrate.

Coal Preparation: Washery effluents contained 0.15% solids, too high for safe discharge into a stream. Addition of 0.013 lb. AEROFLOC 548 per 1000 gallons of effluent reduced solids content of thickener overflow to 0.005%, or clear enough to discharge into a stream.

Cyanamid Field Engineers will be pleased to furnish laboratory samples of AEROFLOC Reagents and to work with you on plant tests. For prompt attention, kindly address our nearest office.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DEPARTMENT

30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y.

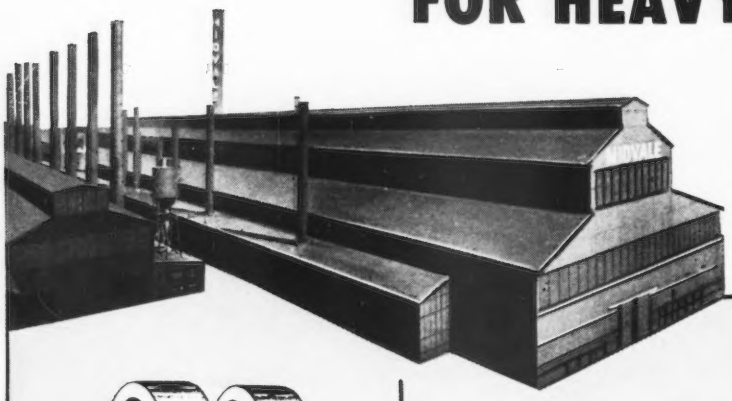
Cable Address — Limenitro, New York

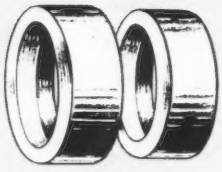
NORTH AMERICAN CYANAMID LIMITED
Royal Bank Bldg., Toronto 1, Ontario, Canada
CYANAMID DE MEXICO, S. A.,
Apartado No. 26012, Mexico 12, D. F., Mexico

CYANAMID PRODUCTS, LTD., Bush House,
Aldwych, London W. C. 2, England
SOUTH AFRICAN CYANAMID (PTY.) LTD.,
P. O. Box 7552, Johannesburg, Union of South Africa

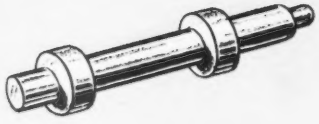
E. P. CADWELL, Casilla 12983,
Correo 11, Santiago, Chile
G. B. O'MALLEY, MALCOLM GLEN,
377 Little Collins St., Melbourne C. 1, Australia

FOR HEAVY EQUIPMENT PARTS... *MIDVALE*

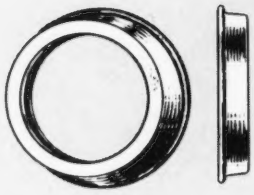




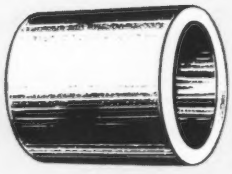
ROLL SHELLS



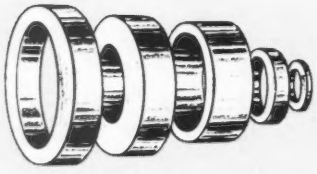
FORGED SHAFTS



TIRES



HEAVY FORGINGS



FORGED RINGS

STAINLESS CASTINGS

Midvale's complete facilities for making carbon, alloy and stainless steel forgings and stainless steel castings offer you a dependable source of supply for maintenance parts on your heavy equipment. Midvale engineers' knowledge and vast experience in designing and forging parts for mining and rock products equipment is available to help you solve your operating maintenance problems. Next time ask for Midvale's engineering and metallurgical service.

THE MIDVALE COMPANY- Nicetown, Philadelphia 40, Pa.

Offices: New York, Chicago, Pittsburgh, Washington, Cleveland, San Francisco

MIDVALE

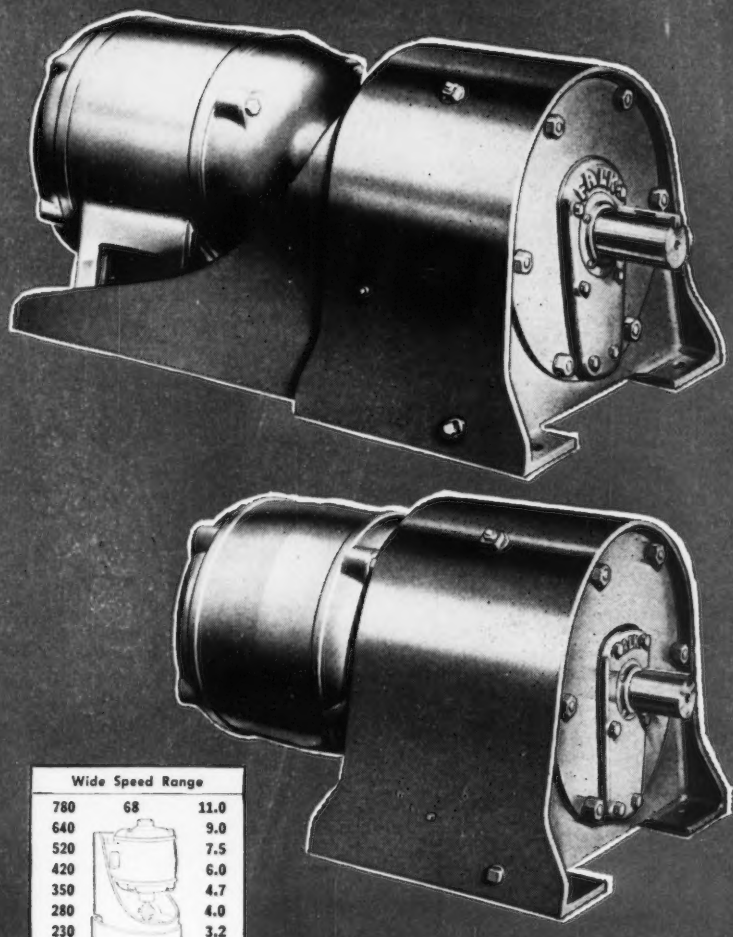
FORGINGS, ROLLS, RINGS, FLANGES, STAINLESS STEEL CASTINGS

Both... All-Motor and Integral

ALL-STEEL FALK Motoreducers

use *complete* motors with *no* modifications

...another important reason why you should consult FALK!

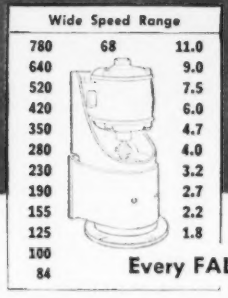


You never have the annoying problem of motor modification when you standardize on *all-steel* FALK Motoreducers. Both the universally popular All-Motor type and the newly redesigned Integral type use *completely standard motors without modification.* The motor can be quickly and easily replaced by another standard motor of any make, type or speed within the unit's AGMA rating when necessary without disturbing the reducing unit.

Many users choose the All-Motor type because it permits easy interchange of motors, *or even parts,* on the job, *in minutes*—and because reducer units and/or motors may be readily transferred from one line or plant location to another. Other users select the new Integral type with standard D-flange NEMA motor because it is a highly compact, streamlined unit providing the utmost in space economy.

In every FALK Motoreducer—All-Motor or Integral—the output speed (ratio) can be changed within the unit's torque capacity without modifying the motor.

Both types give you all the quality, adaptability, dependability and long-range economy for which FALK has been celebrated for more than sixty years. FALK Motoreducers are available from factory, field or distributor stocks throughout the country. Write to Department 247.



Every FALK Motoreducer has these "In-built" Factors—

Wide Speed Range. Selective ratio combinations provide output speeds from 1.5 rpm to 1430 rpm with stock gears.

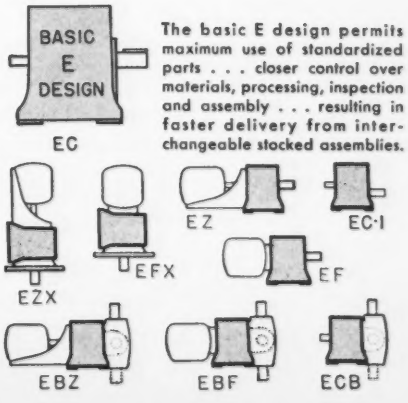
Sealed Housings. Dual closures and one-way vents keep oil *in,* dust and moisture *out.* Units are splash-proof, leakproof, dustproof.

Precision Gearing. Heat treated alloy steel, precision cut and shaved helical gearing throughout . . . quiet-operating crown shaved pinions . . . taper bored gears for easy ratio changes.

All-steel Housings. Unbreakable, strong, rigid. Generous overhung load capacities provided by wide bearing spans, large shafts and bearings.

Streamlined inside and outside. Smooth, clean surfaces; machine welded construction conforms to NEMA motor frames.

Positive Lubrication. Large sump capacity . . . oil-tight construction assures clean lubricant . . . direct dip of revolving elements provides positive lubrication at all speeds.

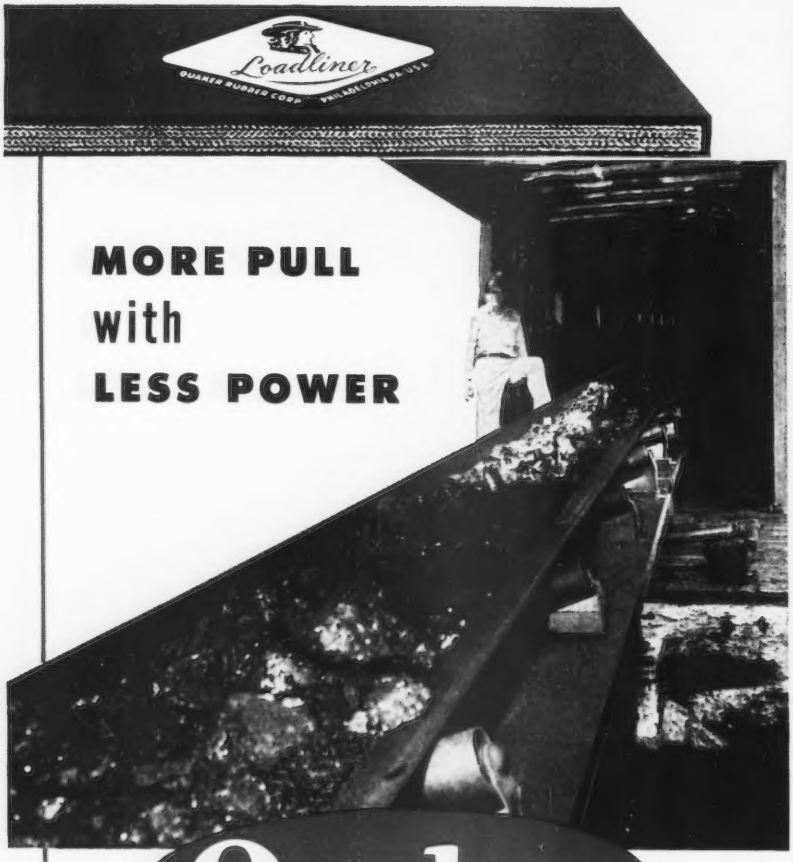


The basic E design permits maximum use of standardized parts . . . closer control over materials, processing, inspection and assembly . . . resulting in faster delivery from interchangeable stocked assemblies.

FALK ...a good name in industry

THE FALK CORPORATION 3001 W. Canal St. Milwaukee 8, Wis.

WRITE TO DEPARTMENT 247



Quaker

LOADLINER
CONVEYOR BELT

Hauling heavy loads with less power is no problem for the Loadliner. Sturdy rayon carcass makes it lighter and thinner than ordinary cotton-carcass belts of equal strength. Highly flexible for good troughability in all weather. Abrasion and mildew resistant. Exceptional fastener—holding strength. Skim coat between plies. Ideal for use on operations calling for long conveyor distances. Available in any length with any number of plies. Widths up to 72". For lower cost per unit carried, use the Loadliner—another Quaker quality product for stand-up endurance.

Write for free folder and name of nearest distributor.

Belting, Hose, Packing and Moulded Rubber of every construction for every need.

QUAKER RUBBER CORPORATION
DIVISION OF H. K. PORTER COMPANY, INC.
OF PITTSBURGH
PHILADELPHIA 24, PA.
Branches in Principal Cities

ILLINOIS

Arrangements to close the Hillsboro metal operation March 1 for an indefinite period were announced by American Zinc Co. of Illinois, subsidiary of American Zinc, Lead & Smelting Co.

Unsatisfactory price prevailing for slab zinc was given as the reason for the curtailment. The plant had been producing at the rate of 650 tons of slab zinc a month.

MICHIGAN

North Range Mining Co., Negaunee, is currently erecting a plant at its Book Iron Mine, at Alpha, Iron County, on the Menominee Range, for the beneficiation of treatable underground ore. The plant will combine conventional sink-float separation and jigging. This is the first time on the Michigan ranges, according to F. J. Haller, vice-president, that an attempt is being made to concentrate ores produced by underground mining.

Cary mine, near Hurley, of Pickands, Mather & Co., has recently placed circular, steel sets in some of its stope scraping sub-levels. The sets are 6 ft high and consist of a cap, two legs (or posts), bottom piece, two rail runners at the base and H beam spreaders on each side about 1 ft above the lowest part of the caps. The sets are 4 ft apart.

Inland Steel Co.'s Cayia mine, near Crystal Falls, although it has produced and stockpiled a small amount of ore from development work, did not ship in 1953. It is expected to enter the shipping list in 1954. Inland Steel Co. shipped a total of 1,467,401 tons in '53 with its two Menominee range shippers—the Sherwood and Bristol mines—producing 672,806 tons of the total. With the exception of the Armour No. 2 mine open pit on the Cuyuna range which produced 153,619 tons, all of Inland's ore came from underground mines.

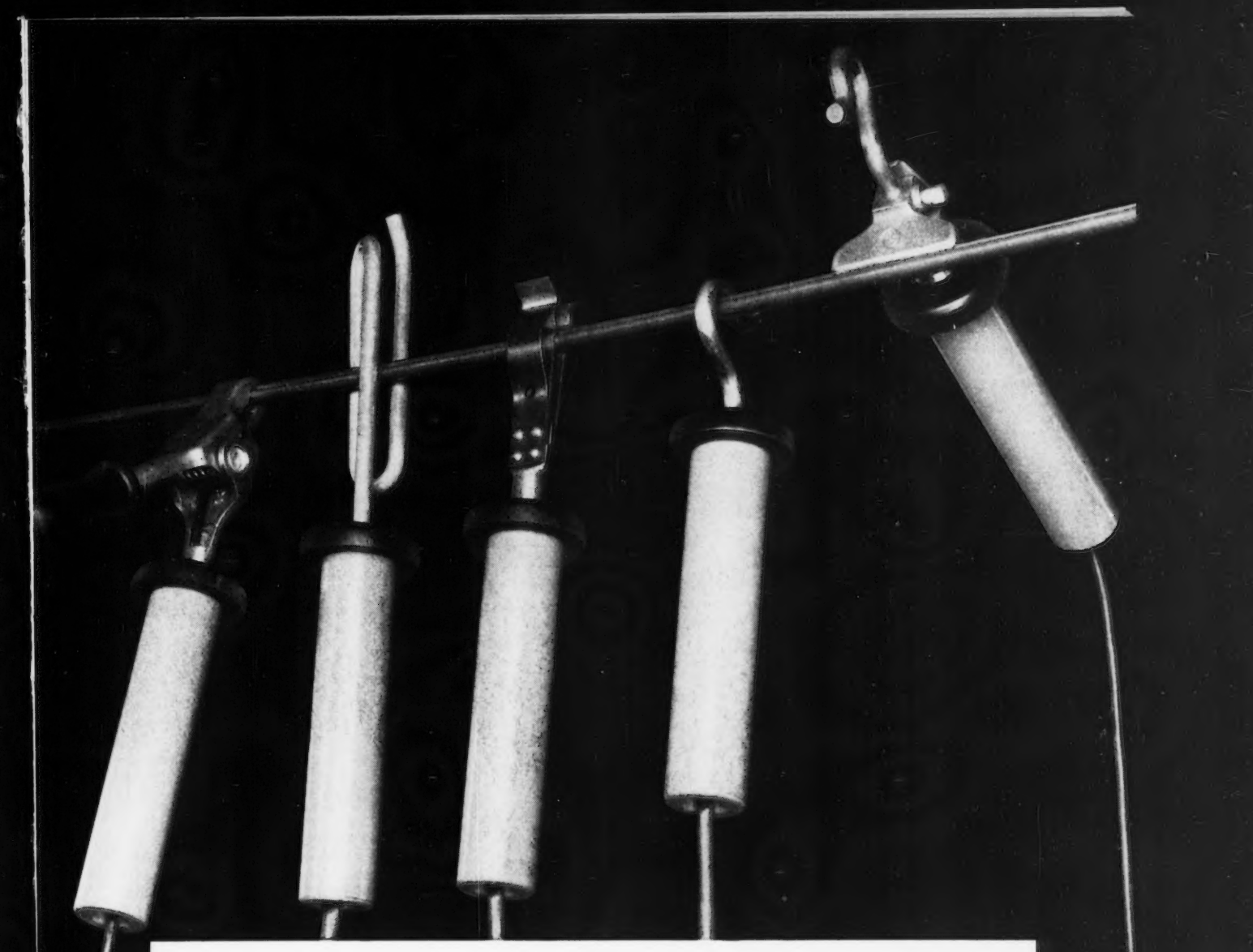
Work on the new surface buildings at the Cannon mine, M. A. Hanna Co., at Iron River is nearing completion. The plant is completely up-to-date and conveniently arranged.

MINNESOTA

Stripping at the South Agnew mine, M. A. Hanna Co., has been on a 15 shift per week basis since December 19th. Morton mine stripping has been on a 20 shift per week schedule. Foundations for the washing and screening plant, surge bin and loading pocket are about completed.

Stripping at the Enterprise, Section 18, Buckeye, Carlz and Mississippi group also has been conducted 20 shifts per week.

In spite of temperatures that range down to 60 deg below zero, water and silt are being removed from Inland Steel Co.'s Steep Rock Lake lease. Philip D. Pearson, formerly of Iron River, Michi-



You Can Save and be Safe with O-B Fused Taps

- Exclusive molded-in asbestos lining in O-B Fused Tap Cases safeguards your men against fuse explosions... lengthens life of tap cases.
- Two vents at top of O-B Tap Cases permit flame from exploding fuse to exit safely without injuring any of your workers.
- O-B Tap Terminals available in different holding strengths from 300 to 2000 pounds to fit your different needs. (Cable broke twice in tests before pulling out of O-B H-1 Terminal).
- Five different O-B Tap Contacts to fit your various needs are heat-tested to assure the lowest resistance electrical path. (See test results in Sept. '53 O-B Haulage Ways).

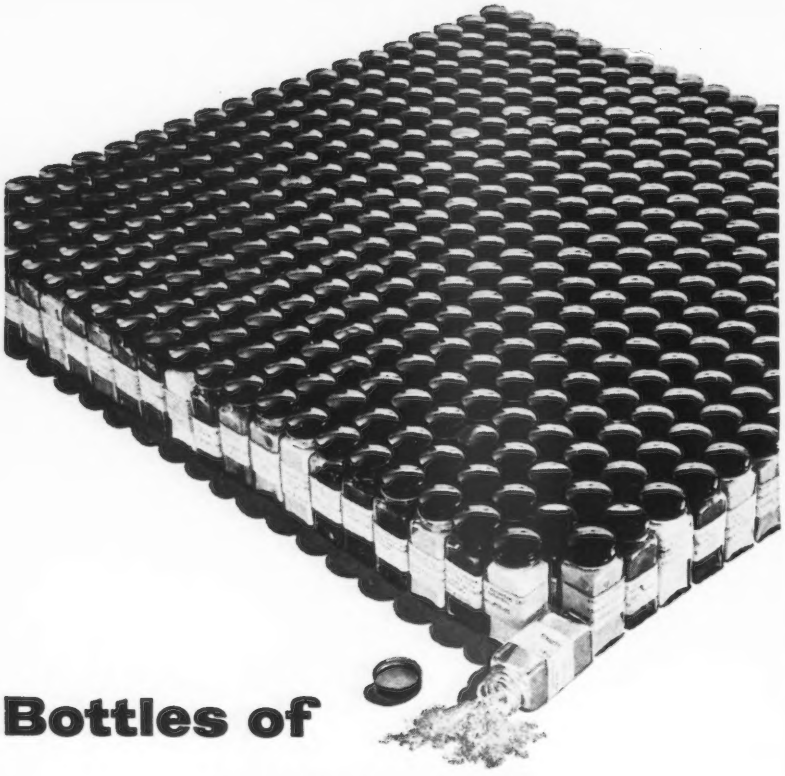
Ohio Brass

MANSFIELD OHIO, U. S. A.

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Feeder and Trolley Materials • Control Materials • Trolley Shoes
Roof Bolt Shells and Plugs • Rail Bonds • Automatic Couplers

4500-M



Bottles of pure profit

These bottles contain samples of dust from literally hundreds of processing plants.

Naturally, because each bottle contained a different combination of dust, it presented a different dust collection problem . . . over 600 of them in the last 3 years!

From knowledge gained by planning, designing, and building dust collection equipment *tailored* to hundreds of different operating conditions . . . Buell has built an unmatched background of reliable and accurate knowledge and experience. From this knowledge, *gained the hard way*, Buell has developed three basic systems of industrial dust collection . . . made dozens of exclusive improvements in equipment.

Be sure you, too, have the latest facts. Send for your complimentary copy of our brochure – The Collection and Recovery of Industrial Dust. Write Buell Engineering Company, Dept.19-C, 70 Pine Street, New York 5, New York.

buell®

MECHANICAL ELECTRICAL *20 Years of Engineered Efficiency in* **DUST COLLECTION SYSTEMS**

Minnesota *(Continued)*

gan, is manager of the Galand Co., Inland subsidiary, which is its operating branch at Steep Rock's "C" or Falls Bay area. Construction Aggregates of Chicago has the dredging contract which requires 68,000 hp of electric energy to pump the silt 4 mi and up 100 ft into Marmion and Finlayson lakes. Cost of operating the dredge runs about $1000 a day. Construction Aggregates also did the dredging for Steep Rock Iron Mines Ltd.

Since its beginning at Trout lake, Coleraine, in 1910 with the opening of the Mesabi's first washing plant by the Oliver Iron Mining Co., the proportion of concentrates to direct shipping ore has steadily increased. At present concentrates from washing, jigging, Heavy-Media, cyclones, spirals, etc., form nearly one-third of Mesabi range shipments. A total of 340-million tons of concentrates has been produced from low grade ores since that first car load appeared 44 years ago.

An earlier than usual ending of shipping combined with a mild fall resulted in a minimum of steaming of frozen ore cars by the Lake Superior ore hauling roads. The cargoes for only four carriers required steaming and these were not as bad as often occurs in late fall shipments.

The steamer Benjamin F. Fairless of the U. S. Steel Corp. fleet had the unusual distinction of being the first and the last boat to take on a load of iron ore at upper lake ports during the 1953 season.

Republic Steel Corp., through its subsidiary, Union Drawn Steel Co., Ltd., Hamilton, Ontario, has acquired 1100 acres of high grade limestone at Embro, near London, Ontario. The deposit will supply Republic's furnaces for many years.

MONTANA

Operations at the Belmont and Badger Mines are being suspended, Anaconda Copper Co. officials announced early in February. The officials said that operations would be suspended as soon as arrangements can be made to transfer the men to other Butte mines. Operations in the Butte mines will continue on a six-day week with the workers on a five-day week.

Quebec Metallurgical Industries Ltd. and Angus McDonald, of Philipsburg, Granite County, reportedly have taken over the Blue Ore group of claims, 6 mi southeast of Dillon, Beaverhead County.

The Blue Ore group opens through a 250-ft tunnel giving a depth of some 150 ft below the surface, with a substantial showing of black manganese oxide ore in a vein. Present plans include extending the tunnel.

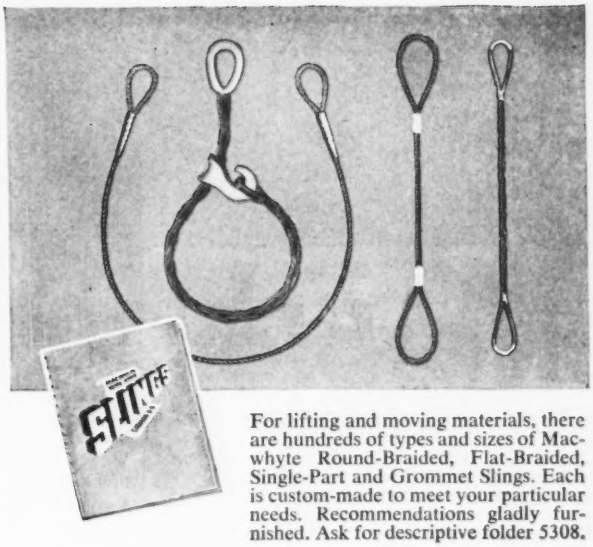
Lands, Inc., with capitalization reported at $300,000, will develop the Viking gold property near Libby, Lincoln

Get long, low-cost service with

MACWHYTE

WIRE ROPE • SLINGS • ASSEMBLIES

In Macwhyte's complete line there are a thousand and one sizes and types of wire rope. Thoroughly lubricated and PREformed—they are engineered to give long, low-cost service on your equipment. Recommendations gladly furnished—ask for Catalog G-15.



For lifting and moving materials, there are hundreds of types and sizes of Macwhyte Round-Braided, Flat-Braided, Single-Part and Grommet Slings. Each is custom-made to meet your particular needs. Recommendations gladly furnished. Ask for descriptive folder 5308.

Macwhyte Safe-Lock Wire Rope Assemblies are made to order in length, strength and flexibility desired. Terminals are permanently attached to one or both ends. Recommendations gladly furnished. Ask for Catalog 5201.

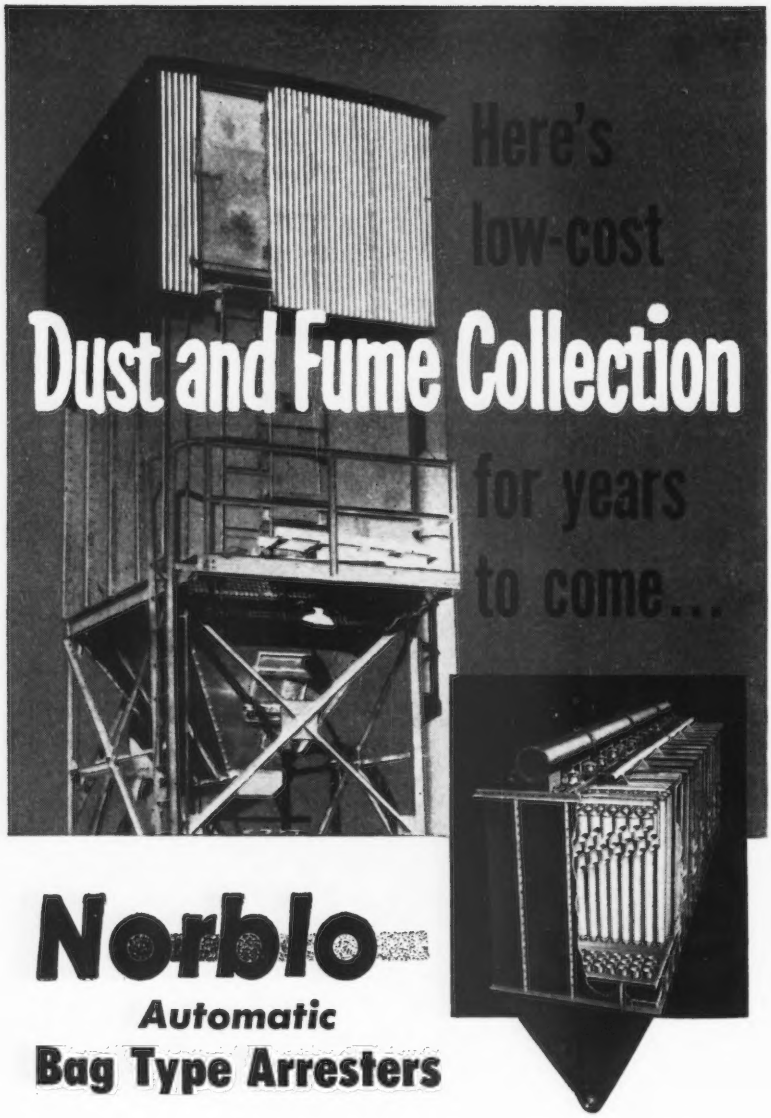
MACWHYTE COMPANY

2937 Fourteenth Avenue
Kenosha, Wisconsin

Manufacturers of Internally Lubricated PREformed Wire Rope—Round-Braided and Flat-Braided Wire Rope Slings—Stainless Steel Wire Rope—Monel Metal Wire Rope—Aircraft Cable and Swaged Fittings—Safe-Lock Wire Rope Assemblies.

Mill Depots: New York, Pittsburgh, Chicago, St. Paul, Fort Worth, Portland, Seattle, Los Angeles. Distributors throughout U.S.A.

10545W



Norblo

Automatic

Bag Type Arresters

Norblo equipment is based on sound, experienced engineering and takes full account of the *scale* of your operation as well as *time* factors, so that Norblo performance can be *guaranteed.*

Norblo arrester design is based on multiples of a basic, standardized compartment. Bag cleaning—fully automatic—is cyclic and periodic, taking only a few seconds for each compartment. In continuous, heavy duty operation, full calculated capacity of Norblo equipment is always available, and investment for equipment of any desired capacity is held to a minimum.

Norblo gives you all four essentials of low cost operation for years to come—advanced design, high efficiency, long life and low maintenance. Write for Bulletin 164-4.

The Northern Blower Company

Engineered Dust Collection Systems for All Industries

6410 Barberton Ave. OLympic 1-1300 Cleveland 2, Ohio

Montana *(Continued)*

County. This was announced by William D. Weaver, Spokane, who will serve as general manager of the new corporation. Other officers include Kenneth H. Clopp, president; Dr. Edward J. Frederickson, vice president, and R. Maurice Cooper, secretary-treasurer, all of Spokane.

Butte Western Mining Co., newly incorporated, has taken a bond and lease on the Isele mining claim in southwest Butte. A 300-ft shaft on the Isele property was unwatered recently and the workings partially cleaned. It was reported that there are two veins exposed at depth which contain values in pink manganese (rhodochrosite), gold, silver, lead and zinc.

Swansea Mines Inc., operating the Silver Bell property in the Marysville District, Lewis and Clark County, plans to sink a winze from the top of a newly indicated silver-copper orebody of good grade. This was announced by C. L. Hewitt, Helena, company president.

Nancy Lee Mines Inc., which has properties 8 mi west of Superior, Mineral County, held a special meeting recently in Kellogg, Ida. Named to its board of directors were Wendell R. Brainard and Wayne A. Brainard, of Kellogg; Harry Alway and Ralph Neyman, of Wallace, and Frank Eichelberger, of Spokane.

It was announced at the meeting that DMEA has approved a loan for the firm. Nancy Lee Mines also has joined Coeur d'Alene mining companies in exploring for uranium in the Big Indian Mining District of San Juan County, Utah.

NEVADA

John C. Kinnear Jr., general manager of the Nevada Mines Division of Kennecott Copper Corp., has been named president of the Nevada Mining Assn., Inc.

Other officers are A. E. Millar, general manager of Anaconda Mining Co. at Yerington, who is first vice president; Roy A. Hardy, consulting engineer for Getchell Mine, Inc., at Red House, who is second vice president; Louis D. Gordon, who was re-elected executive secretary and treasurer; and John C. Kinnear, honorary president.

Members of the board of directors in addition to the officers, elected at the annual dinner meeting, are Percy G. Dobson, general manager of Summit King Mines at Tonopah; Norman E. Hanson, executive assistant for Basic Refractories at Gabbs; F. A. McGonigle, general manager for Manganese Inc., at Henderson; Charles H. Segerstrom, president of Nevada- Massachusetts Co. at Tungsten; H. L. Waldthausen Jr., works manager for Blue Diamond Corp., at Blue Diamond; and S. H. Williston, vice president of Cordero Mining Co. at McDermitt.

Nevada Mines did a gross business of $65,312,000 during 1953, according to final figures released by the U. S. Bureau of Mines. It represented a $2,364,000

You Get More Use per Dollar with Homoflex Hose

For air, water, other fluids and gases Homoflex Hose is
easier to handle because it has no pre-set twist,
coils and uncoils easily with no kinking,
is light in weight, yet strong, and
"Flexible as a Rope."

R/M Hose Engineering makes possible high flexibility . . .
homogeneous cover, strength member and tube
that are inseparable.

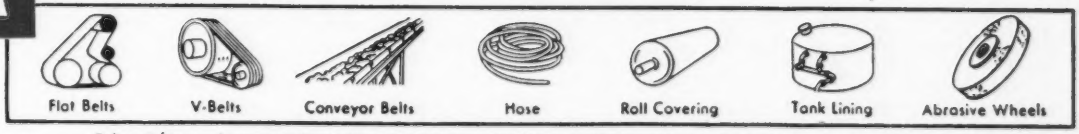
Homoflex Hose gives you
"More Use per Dollar" two ways . . .
men do more work with it . . .
and it lasts longer.

Ask the R/M Distributor for Bulletin 6879 . . .
and, don't forget, there's equally good
"More Use per Dollar" engineering in
All other types of R/M hose, conveyor belts,
V-belts and flat transmission belts.

RM

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls RM 408

E. A. GODOY & CO., INC.
CUNARD BUILDING, 25 BROADWAY
NEW YORK 4, N. Y.

SALES AGENTS
REPRESENTING PRODUCERS OF
CHROME ORES IRON ORES
MANGANESE ORES

New SAMPLING MOIL

- Simple design, spring and ball hold point in place.
- Points may be changed without use of wrenches or other tools.
- No nut to loosen in use or to interfere with angle of cutting.
- Carbide Tipped Points for greater life.

Hayes

HM 524

HAYES STEEL PRODUCTS LIMITED . MERRITTON, ONTARIO

Detachable Drill Bits—Grinding Balls—Mining Equipment
Tranmission, Pole Line, Marine & Industrial Hardware
Universal Joints—Front & Rear Axles—Clutches
Forgings—Stampings—Machining

Nevada *(Continued)*

increase over the 1952 totals. Largest proportion of revenue during the year just ended came from copper, which accounted for $35,460,000 of the total, and tungsten which accounted for $9-million in revenue. Gold mined in Nevada during the year brought a gross of $3,599,050. Zinc output totaled $1,275,300 in value which was a sharp decrease from the previous year.

The Defense Mining Exploration Administration is currently participating in three contracts executed with Nevada mining firms. Caviglia & Parodi, or White Pine County, are engaged in a $27,300 manganese program with $20,475 government participation; Consolidated Eureka Mining Co., at Eureka, is carrying out a $57,050 lead mining program with $28,525 participation from the government; and the Garnet Tungsten Mining Co. in Elko County is carrying out a $21,760 program with $21,760 government participation.

The U. S. Gypsum Co. in northern Washoe County is operating on an around-the-clock basis this winter. The big mill processes the products of the mine, which is situated just over the line in Pershing County. The mill operations, situated at Empire, have established that community as the third largest in Washoe County, being outranked only by Reno and Sparks.

NORTH CAROLINA

At least six separate prospecting operations in search of uranium ore are under way in Stokes, Yadkin and Surry Counties.

Only one prospector didn't mind his name being used. He is L. W. Loftin of Yadkinville, Route 2, who has produced samples of ore from the Courtney section of Yadkin County which show small amounts of radioactivity.

H. & H. Construction Co. of Clarksburg, W. Va., is expected to begin mining operations soon in the mountains of Ashe County, near West Jefferson. The company says the Atomic Energy Commission has classified its ore as thorium gadolinite. It is reported that the company has leased 3,400 acres for mineral rights.

OREGON

Gold output in Oregon was up according to preliminary figures for 1953. The 8,250 oz were valued at $288,750, compared with a total value of $192,815 in 1952. Silver production amounted to about 6,930 oz, compared with 4,037 oz in 1952. Gold output came chiefly from a bucket-line dredge, operated by Powder River Dredging Co. in Sumpter valley of Baker County. There were other small scale intermittent operations—about 10 lode mines and 20 placer mines, most of them in Baker and Grant counties in the east and Jackson and

LIGHT IN THE NIGHT...

Spearing across the snows
of Canada shines this headlight.
But for refractory brick,
the arc wouldn't spark to flash
the headlight, the stainless
steel with which the car is built
would not exist . . . the trucks
she rides on, the motors and the
generators, even the glass . . .
depend for their existence upon
quality refractories
such as Grefco supplies
the world.

Budd Rail Diesel Car on the
Canadian Pacific Railway

GENERAL
REFRACTORIES
COMPANY
Philadelphia

Products of fame . . wherever there's flame

GENERAL REFRACTORIES COMPANY

Oregon *(Continued)*

Josephine counties in the southwest. The silver, copper and lead were produced as by-products of gold mining. The Buffalo mine in Grant County owned by Boaz Mining Co., of Seattle, was the source of most of this output. Value of gold, silver, copper and lead, was reported from preliminary figures, as being $295,860 in 1953, compared with $197,607 in 1952.

OKLAHOMA

National Zinc Co. has announced a cutback in zinc production of 500 tons a month at its Bartlesville plant. Together with an earlier cutback, announced in December, total output reduction amounts to a decrease of 28%.

W. H. Leverett, company president, explained that "unsatisfactory economic conditions in the industry prompted the action."

TEXAS

Production is underway at Freeport Sulphur Co.'s new mine at Nash Dome in Fort Bend County, 35 mi southwest of Houston.

PENNSYLVANIA

First contract for purchase of uranium ore in the eastern United States is being negotiated between the Atomic Energy Commission and the Lehigh Navigation Coal Co.

Uranium was discovered on company lands near Mauch Chunk in Carbon County. The radioactive deposits are in sandstones and are similar to those found in small carnotite deposits in the Colorado Plateau. Plans are to begin mining the uranium ore this spring.

UTAH

Approximately 9,000 Kennecott Copper Co. employees in Utah and Nevada began a 40-hour work week in mid-February, J. Parnell Caulfield, general manager, Kennecott western mining division, announced in Salt Lake City.

Utah Copper employees have had a 48-hour work week since December 1949; Nevada Mines Division has been on a 48-hour week since March 1950.

Meanwhile, W. G. Rouillard, manager, American Smelting & Refining Co., announced that the Garfield Smelter was placed on a 40-hour work-week basis Feb. 22. However, it was made clear that, while men would work on a 40-hour basis, the smelter will continue its seven days per week processing of concentrates from Kennecott's Utah Copper Division.

Consolidated Coppermines Co., Ely, Nev., was scheduled to make its working hour cutbacks through Isbell Construction Co., its contractor, to accommodate milling and smelting changes at the McGill plants of Kennecott's Nevada Mines Division.

Utah Copper employs some 5,600 men at the Bingham open pit mine, Garfield, Arthur and Magna. Some 1,600 are employed at Ruth and McGill, Nev., by the Nevada division; 1,500 men are on the AS&R payroll at Garfield, and about 100 men at Consolidated Coppermines.

Kennecott earlier announced a work week reduction at Chino, N. M., and Ray, Ariz., effective Feb. 1.

It is expected that average monthly paychecks will be reduced about 23% by the work-week cut, but no unemployment will result. According to Utah Copper Division's L. F. Pett, 489,000 tons of ore will be mined and milled weekly at Utah Copper, as against the former production schedule of 580,000 tons of ore weekly. The Nevada Mines Division is expected to trim output from the former 140,000 tons of ore weekly to 120,000 tons.

Under the new schedule, Utah operations will be shut down on Sunday insofar as technical conditions permit.

The $3.3-million improvement program at Kennecott Copper Corp.'s Utah Division mills will be completed in March, L. F. Pett, division general manager, reported.

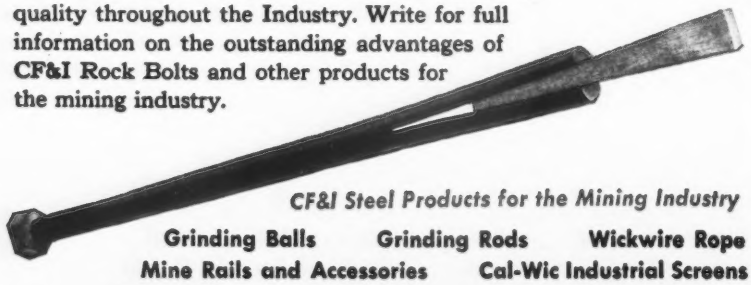
Arthur Mill flotation circuit additions and replacements went into operation in July 1953. The changes due for March completion are at the Magna

CF&I ROCK BOLTS

THE MODERN MINE SUPPORT

CF&I Rock Bolts, in slot and wedge design or the new expansion shell type with Pattin shell, are the answer to greater safety, economy and better housekeeping.

Safety-minded production men recognize the advantages of CF&I Rock Bolts—the standard of quality throughout the Industry. Write for full information on the outstanding advantages of CF&I Rock Bolts and other products for the mining industry.



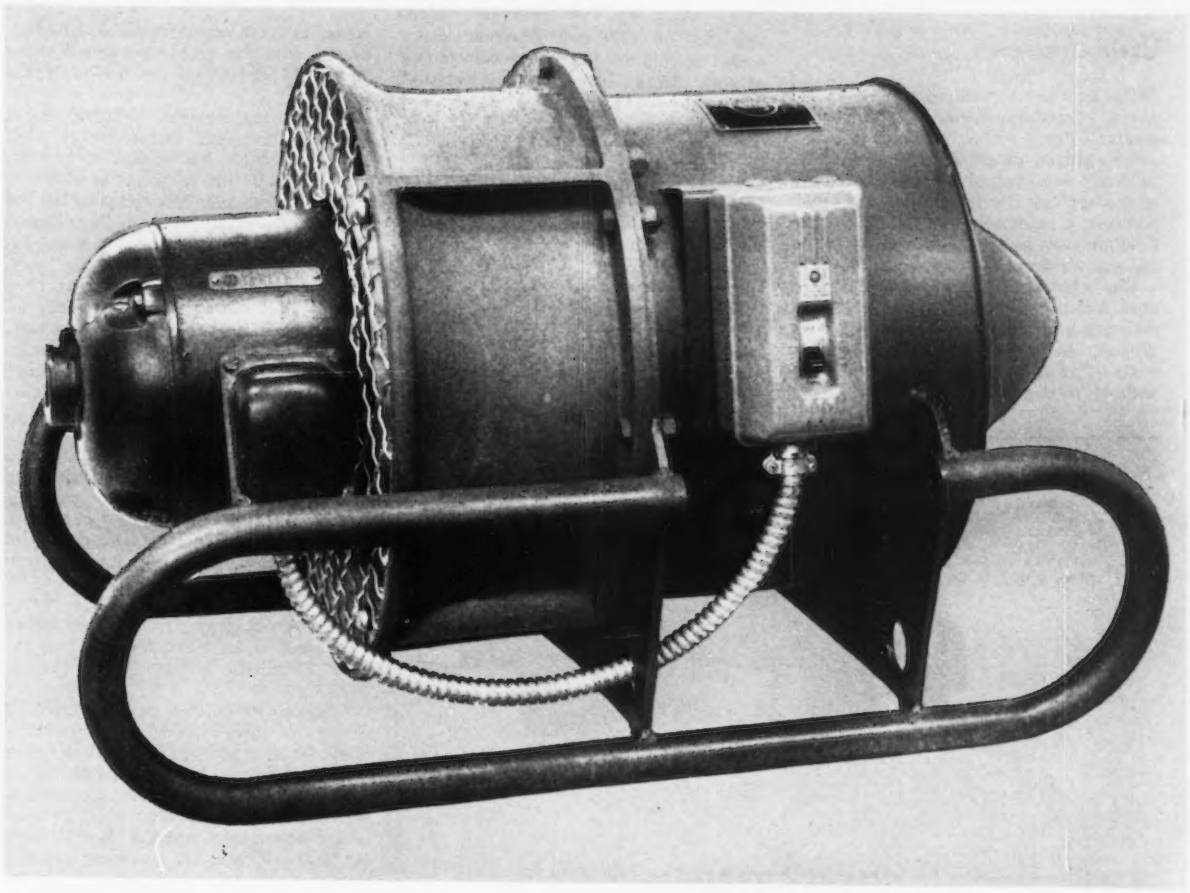
CF&I Steel Products for the Mining Industry

Grinding Balls Grinding Rods Wickwire Rope
Mine Rails and Accessories Cal-Wic Industrial Screens

CF&I ROCK BOLTS

THE COLORADO FUEL AND IRON CORPORATION
DENVER • NEW YORK • OAKLAND

2120



NEW... 5 H. P. AERODYNE FAN

To be used with tubing for auxiliary ventilation inside the mine. Either for suction or blowing.

Volume — 6200 C.F.M. free delivery.

Induction Motor — standard flange-mounted, totally enclosed, ball bearing, constant speed — 3450 R.P.M. (operating speed).

Power Characteristic — Non-overloading.

Furnished in open or permissible equipment.

Let us tell you more about this
NEW Portable Blower with its low height... light weight

COAL CUTTERS	BUCKET ELEVATORS
LOADERS	PULVERIZERS
SHUTTLE CARS	CHAINS
LOCOMOTIVES	DRILLS
JIGS	CAR PULLERS
CRUSHERS	STACKERS
FEEDERS	TIPPLE MACHINERY
CONVEYORS	

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED
. . .IT'S A JOB FOR JEFFREY!

Utah *(Continued)*

mills, and are expected to result in recovery of additional quantities of molybdenite.

The Magna program includes addition of a six cell unit of flotation machines at the end of the former 56 rows. In addition, a separate section of 18 cleaner flotation cells is being added to treat the concentrate from the new six-cell unit.

The additions being installed will produce fuller treatment, making for added recovery of copper and molybdenite. At Arthur, the program included replacement of 58 rows of 56-in. flotation units with 45 rows of 62-in. units, with a six-row addition made to 23 flotation cleaner rows. In addition, the electrical systems at both plants have undergone extensive updating.

Following a study of operations of the new cobalt refinery at Garfield, made by Battelle Memorial Institute, Howe Sound Co. and Chemical Construction Corp. have reached an agreement concerning the operation of the plant.

The refinery, owned by Calera Mining Co., a subsidiary of Howe Sound, was designed and built by Chemical Construction Co., a subsidiary of Chemico-American Cyanamid Co. Since the start of operations at the Garfield plant nearly two years ago, production has been reported at about one-third the designed capacity, with the output of cobalt metal from the operation on a interrupted basis.

H. H. Sharp, president of Howe Sound, reported this week that a report from Battelle Institute has confirmed that the chemistry of the process involved is sound. However, recommendations of changes needed to result in "a commercial operation" may approximate $1-million.

As a result, an agreement has been reached with Chemico effective Feb. 15, and extending over a two-year period. The agreement provides for Chemico management and operation of the Garfield plant, which will treat concentrate furnished by Calera from its mine at Cobalt, Ida.

Calera, it is reported, will pay Chemico a fixed "toll" per pound of cobalt alloy and other marketable cobalt products which will be marketed by Calera. Chemico will be paid an agreed per ton price for any ammonium sulphate produced.

During the period of Chemico operation, Chemico may purchase and install equipment at an expenditure not to exceed $1-million without prior consent from Calera.

Chemico would then be reimbursed by Calera for such installation expenditures after the two year period only if plant tests showed an output capacity of at least 8,000 lb of metal daily, a minimum recovery of 90% of the cobalt content in the concentrate treated, and if costs are kept within a set maximum production cost, according to Sharp. Otherwise Calera would have no obligations to repay the new capital expenditure costs made by Chemico.

TENNESSEE

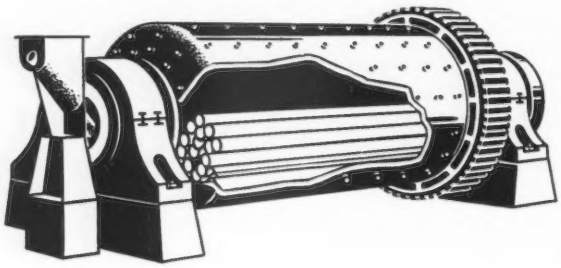
Plans to shut down the Grasselli Mine at New Market March 1 for an indefinite period were announced by American Zinc Co. of Tennessee, subsidiary of American Zinc, Lead & Smelting Co.

The shutdown will idle about 80 workmen. Previously, the company had closed two mines near Jefferson City, thereby layng off some 50 workers.

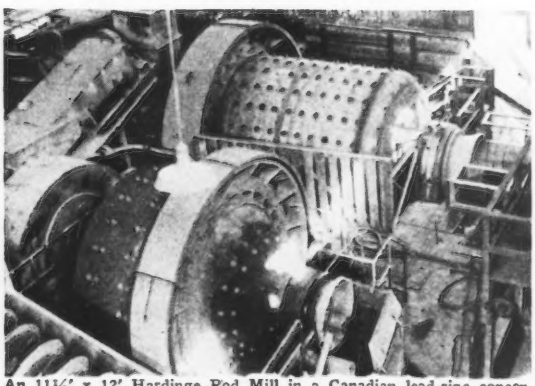
Harley A. Coy, the company's Tennessee superintendent, said that the shutdown stemmed from a surplus of zinc in this country.

The new plant of the Electro Manganese Corp., Knoxville, reached rated capacity during December, it has been announced. The first pound of metal at the "Loraine Street" plant was produced on Nov. 11, 1953. It was built at the request of the Defense Materials Procurement Agency, with the assistance of a Government loan, at a cost of about $2-million.

Producing electromanganese in the form of cathode chip, 99.9 plus percent purity, the new plant doubles the country's available supply. Previous capacity of the company's "Procter Street" plant, also in Knoxville, was 10 tons a day, it was added.



CONVEX-HEAD
ROD MILLS



An 11½' x 12' Hardinge Rod Mill in a Canadian lead-zinc concentrating plant, rear. In the foreground, a Hardinge 10' x 48' Conical Ball Mill.

The Hardinge Convex-Head Rod Mill is ideal for producing minimum oversize when grinding in open circuit. Pulp level may be changed from high to low for best grinding efficiency and discharge may be made through the periphery (end or center) or discharge trunnion. This mill maintains perfect end alignment of the rods, preventing undue head wear, eliminates congestion at the feed end, and provides a rough classifying action at the discharge end. Bulletin 25-C-1.

HARDINGE
COMPANY, INCORPORATED

YORK, PENNSYLVANIA · 240 Arch St. · Main Office and Works

New York · Toronto · Chicago · Hibbing · Houston · Salt Lake City · San Francisco

VIRGINIA

Zinc production in the Old Dominion during 1953 rose 32% over 1952 and was higher than that of any year since 1944, according to the Interior Department. Zinc output was 17,338 short tons, valued at $3,779,684. Lead production fell 21% despite the rise in zinc output.

New Jersey Zinc Co. reported completion of the first stage of development at its Ivanhoe Mine, 2½ mi southwest of Austinville, in Wythe County.

The Ivanhoe Mine is expected to be a substantial producer of zinc ore. This ore will be concentrated at the Austinville mill.

Ore will be transported underground to Austinville through a 13,300-ft tunnel, of which 1000 ft has been driven.

Company officials commented that the Austinville mine and 2400 mill operated throughout 1953. Zinc concentrates produced were smelted at Palmerton, Pa., and Depue, Ill. Lead concentrates also were shipped to out-of-state smelters.

Purchase of the lead-zinc Arminius Mine near Mineral, Louisa County, has been announced by New Jersey Zinc Co. The mine has been unproductive since 1911 but drilling at the property showed promising results. The company had had the mine under option since 1951. Pumping and mining equipment are to be installed to facilitate further exploration.

WYOMING

Two California men have made what they believe to be "substantial" uranium strikes in the southeastern corner of Fremont County.

Lawrence J. Bergsten of Oakland and his partner, Virgil R. Herring of Aptos, Calif., filed notices—one for the Red Desert and the other on the opposite sides of Crooks Gap on the edge of the Sweetwater Valley. The newest find is located 4 mi south and 2 mi west of Crooks Gap.

The two have filed on 26 claims in the Red Desert and three in the Crooks Gap area. The Atomic Energy Commission has inspected both sites and expressed "extreme interest".

WISCONSIN

Davis Mining Enterprises is continuing work on its Arthur Lease just outside Linden.

Davis enterprise is being financed in part by a $220,000 loan from the Reconstruction Finance Corp. to fulfill a DMPA floor contract (see *E&MJ*, February 1954, p 184).

Construction of a jig and flotation mill is underway on the Arthur Lease, site of the old Robart-Hinkle mine.

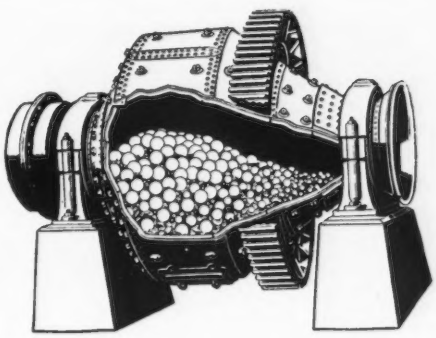
The mine will be dewatered by pumping through an old shaft into the Hinkle. Access to the south pitch of the orebody will be through a 260-foot inclined adit driven at a 12% grade to the bottom of the blue limestone and mining will be carried on down into the oilrock and the glassrock. Room and pillar mining will be carried on, drilling done by airlegs, powered by a portable underground compressor. Mine rock will be loaded by a Caterpillar D-4 into diesel trucks for haulage to the surface.

The mill is being built on a steep hillside and is so designed as to take maximum advantage of the force of gravity. 240 tons per day of unsorted mine rock will be trucked to the primary 15-in. x 24-in. jaw crusher.

Secondary crushing will be by a 2-ft x 4-ft Traylor TY gyratory set up in closed circuit with a 48 in. dia x 12 ft long scrubbing and sizing trommel screen. Undersize from the trommel will be dewatered by classifier and sent to a 175-ton jig feed bin which will feed to a 6-cell 36-in. x 36-in. Bendelari diaphragm jig.

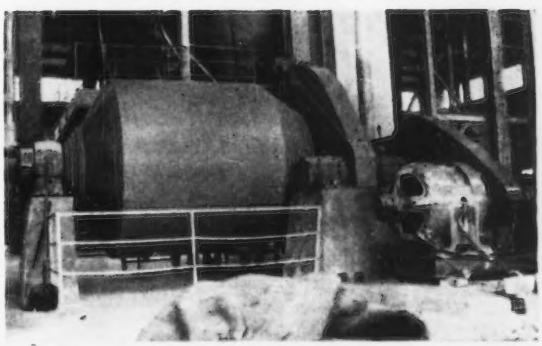
Concentrate produced from the jig will be taken by a smittem elevator to a dewatering classifier which sends it to a 25-ton ball mill surge bin. Tailings from the jig will be dewatered by a classifier and the overflow from the trommel-, smittem-, and tailing-classifiers will go to a 30-in. dia thickener which will return the fines to the ball mill classifier.

140 tons per day of minus ½-in. heads will be fed to a 6-ft x 4-ft Eimco ball mill hooked up in closed circuit with a Wemco 30 in. x 17-ft-6-in. double pitch classifier.



CONICAL
BALL AND PEBBLE MILLS

The principle of the Hardinge Conical Mill is sound. The mill shape is in the form of a truss, making for strength without excess weight. Extra weight means extra power and operation costs. Grinding media and material are segregated by size, becoming progressively smaller toward the discharge end. Thus grinding energy is roughly proportional to size of material ground. Bulletin 17-B-1 for dry grinding; AH-389-1 for wet grinding



An 8′ x 84″ Hardinge Conical Pebble Mill in a talc grinding operation.

HARDINGE
COMPANY, INCORPORATED
YORK, PENNSYLVANIA · 240 Arch St. · Main Office and Works
New York · Toronto · Chicago · Hibbing · Houston · Salt Lake City · San Francisco

Wisconsin *(Continued)*

Classifier overflow will be sent to a 4-cell lead circuit composed of No. 18-special Denver Equipment Co. cells. Lead concentrate will be cleaned on a half-size table and the tailings sent to a 6 ft x 6 ft Denver zinc conditioner which will feed into an 8-cell No. 18-special Denver Equipment Co. zinc circuit. Six cells of the zinc circuit will be used for roughing, one for cleaning, and one for recleaning.

The zinc concentrate will be dried on a 6 ft 3-disc American filter and shipped from Edmund, 4 mi from the Davis Mill, via Chicago & Northwestern Railway to Matthiesson & Hegeler zinc smelter at LaSalle, Ill. W. B. McFee will be in charge of milling operations.

WASHINGTON

Underground work has been resumed on a 2-shift basis at Sunshine Mining Co.'s Little King tungsten exploration project near Deer Park. An adit tunnel of about 150 ft has been driven on the south of Blue Grouse mountain at 3700 ft elevation. Mine camp buildings have been completed and the access road has been improved. A combination cook house and miner's change house has been built near the tunnel portal and a 100-ft snowshed from portal to dump. A gasoline-powered air compressor is being used. The project was started last summer.

Zinc production was at a record in the State in 1953 and output of both gold and silver also was higher. Zinc production of 32,890 tons was 64% higher than in 1952, according to preliminary annual figures. Gold output which totaled 62,400 fine oz was 14% higher than the previous year and silver with 329,700 oz was up 4%. Copper output of 3,700 tons was down 15% in 1953, and lead was 7% lower with output totaling 10,970 tons.

Value of zinc output was listed as $7,170,020, an increase of only 7% over 1952 due to lower prices of zinc. Values for the other metals for 1953 were: Gold, $2,184,000 ($1,917,160 in 1952); silver, $298,395 ($285,674 in 1952); copper, $2,116,400 ($2,108,788 in 1952), and lead, $2,918,020 ($3,781,568 in 1952). Total value of production was a bit less this past year than in 1952, figures being $14,686,835, compared with $14,767,054 in 1952.

Pend Oreille Mines & Metals Co. announced that it had milled 500,042 tons of zinc-lead ore during 1953 in the Metaline District of northeastern Washington. This was said to be a 40% increase over that milled in 1952.

Jens Jensen, of Spokane, company treasurer, disclosed that expansion plans call for handling nearly 1-million tons of ore annually. Output now is averaging 1500-1600 tons of ore daily.

Pend Oreille Mines & Metals Co. reported a 40% increase in lead-zinc ore produced in 1953 to pass the half-million ton mark for the first time. Figures released by Jens Jensen, vice president and company treasurer, showed 500,042 tons of ore milled during 1953.

Output compared with 356,205 tons in 1952 and 273,580 tons in 1951. The increased production resulted from an expansion program—still growing—which calls eventually for handling between 900,000 and 1-million tons of ore annually.

Jensen pointed out that the Josephine Mill, idle throughout 1953 as a result of low metals prices, would have added 250,000 tons to last year's production had it been operative.

The 1953 production was wholly from the new concentrating plant on the east side of the Pend Oreille River north of Metaline Falls, Wash. The mill has two 800-ton-a-day units operating and proposes a third.

Jensen also attributed increased output to trackless mining equipment which materially reduced per-ton costs underground, offsetting to some degree the lower prices.

Consolidation of Sunny Peak Mining Co. and Ambassador Mines Corp. was announced in January by Charles J. Weller, Coulee City, Sunny Peak president. Ambassador reportedly relinquishes its lease and option to buy 21 claims in Sanders County, Mont., from Sunny Peak and transfers the adjoining Black Bear mining claims and its mine machinery and equipment to Sunny Peak.

Get more footage at lower cost with

SPANG

ALLOY-STEEL

Weldless Jars

...forged from ONE PIECE of Alloy Steel

NO WELDS TO BREAK . . .

Each SPANG WELDLESS JAR is forged from a single piece of selected alloy steel and is scientifically heat-treated and tempered to obtain proper hardness and toughness in the rein sections for maximum strength and wear resistance in the most severe drilling service.

The joints, heat-treated and precision machined, are stronger and more durable, assuring fewer fishing jobs. Records over the years show up to four times more footage with SPANG Alloy-Steel WELDLESS JARS.

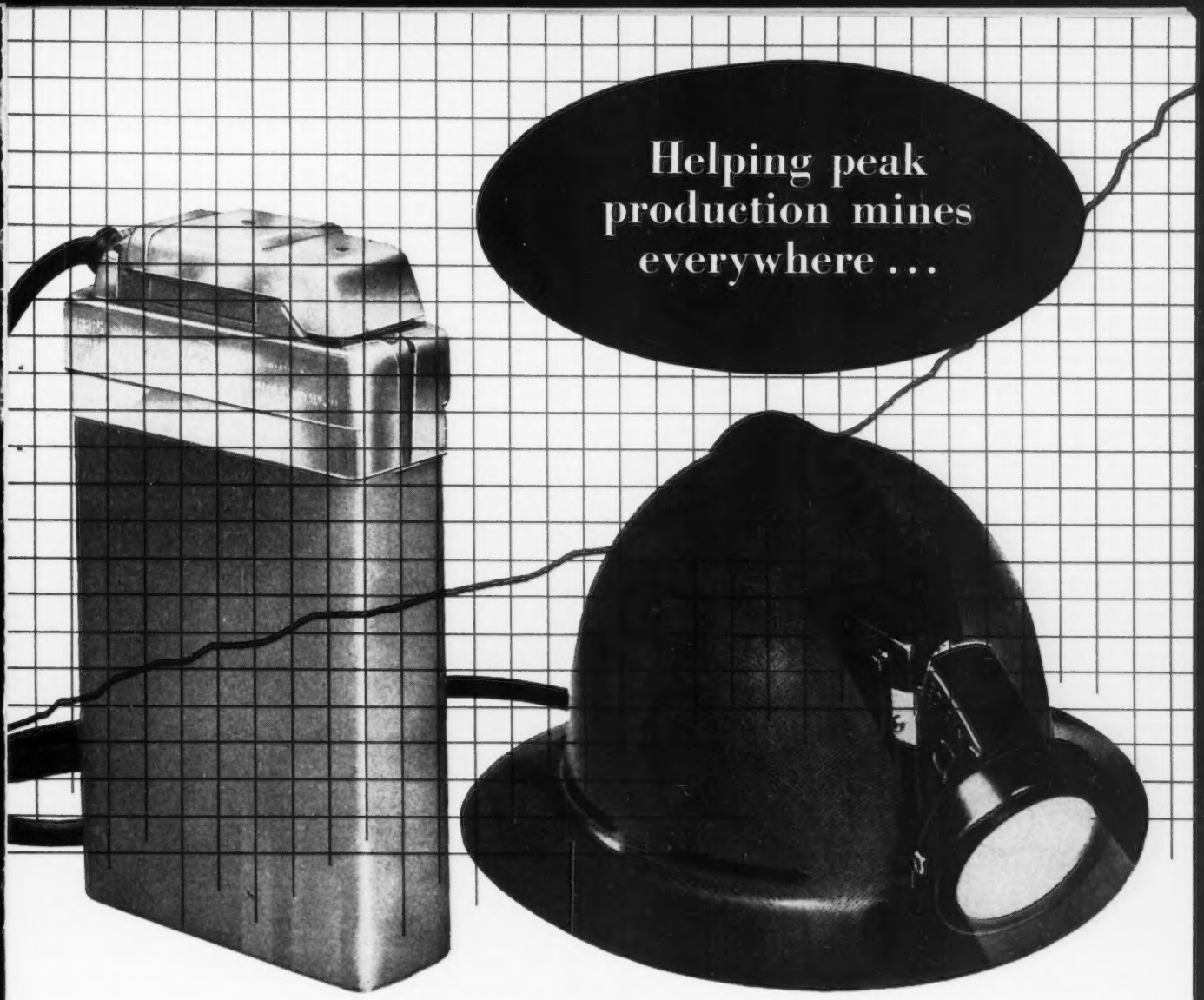
For further information on weldless jars, and for FREE CATALOG of other SPANG cable tools, contact your nearest Dealer or write direct to:

The HIGHER STANDARD

SPANG & COMPANY

DEPT. M-2 • BUTLER, PENNSYLVANIA

For over 60 years Manufacturers of Spang Weldless Jars and a Complete Line of Cable System Drilling and Fishing Tools for Oil and Gas Wells, Water Wells, Prospect Drilling and Shot Blast Holes.



Utilize the *greater output*
that's *built into* mechanized equipment . . .
the **EDISON R-4** ELECTRIC CAP LAMP

The more and better light of the Edison R-4 Lamp is transferring the production advantages of today's modern equipment into steadily climbing tonnage figures in the nation's top production operations. Throwing a brilliant, unfailing beam, this vital mining tool gives miners the light they must have to work mechanized equipment at its greater capacity, safely.

MSA
SAFETY EQUIPMENT HEADQUARTERS

MINE SAFETY APPLIANCES COMPANY
BRADDOCK, THOMAS AND MEADE STS., PITTSBURGH 8, PA.
At Your Service: 68 Branch Offices in the United States
MINE SAFETY APPLIANCES CO. OF CANADA, LIMITED
Toronto, Montreal, Calgary, Winnipeg, Vancouver, New Glasgow, N.S.

When you have a safety problem, M.S.A. is at your service. Our job is to help you.

Washington *(Continued)*

The equipment will be moved to the Gubser silver property near Conconully, Wash.

DMEA has agreed to share half the cost of a $219,410 exploration project for copper in Buckskin Mountain in Chelan County. Howe Sound Co., which operates the Holden Mine, will drive from the old mine into Buckskin Mountain in search of copper and probably nickel. It is understood that the bore will be about 4,000 ft long. Contract runs for two years.

Pacific Northwest Alloys Inc. shut down its ferrochrome reduction plant at Mead, Jan. 9, waiting for improvement in the stainless steel market. Operations had been gradually curtailed for about a month so only about 10 additional workers were laid off.

IN CANADA

ONTARIO

Spotlight this winter is on Manitouwadge. This new base metal field, in a section northeast of Lake Superior which was virgin forest a few months ago without roads or human inhabitants, has all the makings of a big tonnage mining camp.

Leading star in the show is Geco Mines, where limited drilling has reportedly outlined some 10,000 tons of ore per vertical foot, with no limits yet reached. The orebody appears to be divided in two sections (they may be entirely separate deposits), one high in zinc with lower copper values, the other richer in the red metal.

Drilling to date in the zinc section showed a length of 900 ft averaging 9.78% zinc, 1.04% copper, and 2.65 ozs of silver across true width of 57 ft. Dimensions cannot yet be given for the copper section, but the best two holes so far showed (1) 96 ft averaging 4.84% copper, 2.89% zinc, 3.23 oz of silver; and, (2) 160 ft west of this, 149 ft averaging 2.84% copper and 2.84% zinc, with silver values to be added.

The company has $1-million on hand and will undoubtedly be planning underground work this summer. Construction of a permanent road to the camp will be started at break-up, the mine being 25 mi from the nearest railway.

In the meantime an area many square miles in extent has been staked solidly, half-a-dozen other companies are already drilling or surveying, and intense activity by many others is promised for the coming spring and summer.

Adjoining Geco to the west is Willroy Mines, holding ground in which a strong break has been traced for 2,000 ft, with high copper-zinc values obtained in preliminary surface work; the break is on line of strike of the Geco ore which so far has been drilled to within less than 2,000 ft of the Willroy boundary. Willroy is starting a drilling program.

Third outstanding prospect in the Manitouwadge area is Lun-Echo Mines with a large acreage in the camp's north section. Three separate copper-zinc showings have been found, although only limited prospecting has been done, and drilling is just getting under way. Lun-Echo is controlled by New Mosher Longlac Mines, an affiliate of Ventures Ltd.

West of Willroy a large group is held by Delmico Mines, a subsidiary of New Delhi Mines which holds the vendor interest. The granite-greenstone contact which crosses Geco and Willroy is believed to traverse the Delmico claims for a distance of two miles. Electromagnetic and magnetometer surveys are in progress, and plans have been made for drilling.

East of Geco about a mile an 18-claim group is being geophysically surveyed by Area Mines, with the granite-greenstone contact the main object of interest. North of Willroy a group has been taken by Glenburke Mines, subsidiary of Joburke Mines. Copper-zinc values have been picked up in surface trenching along a strong fault zone. Several groups nearby are held by Consolidated Howey Mines, which was part vendor of the Geco and holds a reported 30-40% interest in that company. Some 8 mi west of Geco a group has been taken on a granite-greenstone contact by

For Quality Plus Service in "C.P." ACIDS

Specify "BAKER & ADAMSON"®

FOR YOUR "C.P." ACID NEEDS—IN PLANT OR LABORATORY—see "Baker & Adamson," industry's dependable, convenient source of reagent acids for over half a century.

TO GIVE YOU THE VERY BEST, Baker & Adamson "C.P." Acids are always made to meet or surpass the strict purity standards established by the American Chemical Society for reagents suitable for careful analytical work. Every ton—every pound—is "quality controlled" at each step on its way to you.

TO SERVE YOU WELL, production facilities for B&A Reagent Acids are strategically located across the nation; and ready-for-delivery stocks are carried by B&A's chain of distributing stations in industrial centers from coast to coast. Any of the B&A offices listed will handle your order promptly and efficiently.

REAGENTS B·A STANDARD OF PURITY FINE CHEMICALS

SULFURIC ACID
95-96%, Reagent, A.C.S. (Sp.Gr. 1.84)

NITRIC ACID
70%, Reagent, A.C.S. (Sp.Gr. 1.42)

HYDROCHLORIC ACID
37-38%, Reagent, A.C.S. (Sp.Gr. 1.18)

ACETIC ACID
Glacial, 99.5%, Reagent, A.C.S.

Packaged in 5-pt. Screw-Cap Bottles in special 9-Bottle Case; and in 6½ Gallon Screw-Cap Carboys.

BAKER & ADAMSON *Reagents*

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

Offices Albany* • Atlanta • Baltimore* • Birmingham* • Boston* • Bridgeport* • Buffalo* Charlotte* • Chicago* • Cleveland* • Denver* • Detroit* • Houston* • Jacksonville Kalamazoo • Los Angeles* • Minneapolis • New York* • Philadelphia* • Pittsburgh* Providence* • St. Louis* • San Francisco* • Seattle • Yakima (Wash.)
In Wisconsin: General Chemical Company, Inc., Milwaukee
In Canada: The Nichols Chemical Company, Limited • Montreal* • Toronto* • Vancouver*
SETTING THE PACE IN CHEMICAL PURITY SINCE 1882
*Complete stocks are carried here

Largest* deep frame *jaw crusher ever built...

CRUSHES 1000 TONS OF HARD ROCK PER HOUR *

Designers and Builders of:
STEEL MILL MACHINERY
HYDRAULIC PRESSES
CRUSHING MACHINERY
SPECIAL MACHINERY
STEEL CASTINGS
Weldments "CAST-WELD" Design
ROLLS: Steel, Alloy Iron, Alloy Steel

* set for 10½" discharge opening

This Birdsboro-Buchanan 66" x 84" primary crusher—the largest deep frame jaw crusher ever built—accelerates total plant production. Set for 10½" discharge opening, it crushes 1000 tons of hard rock per hour. For jaw crushers that give dependable, low-cost service—for help in planning your crushing requirements—call on Birdsboro-Buchanan engineers.

Cr-1-54

BIRDSBORO

BIRDSBORO STEEL FOUNDRY & MACHINE CO., BIRDSBORO, PENNA. Offices in Birdsboro, Pa. and Pittsburgh, Pa.

Ontario *(Continued)*

Brewis Red Lakes Mines, and a geophysical survey is in progress. Adjoining both Willroy and Glenburke is Parbec Mines; while also north of Willroy is a 13-claim group held by United Montauban Mines, lead-zinc producer of Quebec's Anacon area. Another large group nearby is in the hands of Conwest Exploration Co., which is planning a vigorous exploration program.

Other companies in the new area, some already active, others awaiting better transportation and weather, are Oklend Gold Mines, West Wasa Mines, Winora Gold Mines, Little Long Lac Gold Mines, Headway Red Lake Mines, Dunvegan Mines, New Highridge Mining Co., Pacific (Eastern) Mines, Larum Mines, and many others.

Production plans are being considered by North Range Mining Co. for its iron ore properties on the Atikokan Range 7 mi west of Steep Rock Lake. Plans would include the installation of a sintering plant.

The property is an old one from which some production was had fifty years ago. It was acquired a few years ago by the present owners, operators of three mines in Northern Michigan, and subsequent drilling and limited underground work have indicated about 13-million tons of magnetite-pyrrhotite iron ore with high sulphur content. Potential production would include recovery of the sulphur as well as the main product, a high grade iron sinter.

Added interest in the uranium possibilities of Southeastern Ontario is reflected in the acquisition by Newkirk Mining Corp. of 350 claims in the Bancroft area. Staked after completion of an airborne scintillation counter survey, the ground covers a number of significant looking anomalies. A large scale program of exploration is planned. Also in the area with ground acquired as a result of the survey are Conwest Exploration Co., Orchan Uranium Mines, Iso Uranium Mines, El Sol Gold Mines, Bonville Gold Mines, and Quejo Mines. All are planning work during the coming season.

Moneta Porcupine Mines and Coldstream Copper Mines have signed an agreement under which the Coldstream property, about midway between Port Arthur and Steep Rock Lake, may be brought to production. Moneta has a fixed time in which to test the mine's potential and may then proceed to form a 5-million share company. Coldstream shareholders would receive shares in the new company on a one-for-one basis, and Moneta would advance funds via income bonds for mine expansion and mill construction, receiving a bonus of 127,500 shares for each $100,000 advanced.

Another mill is being built in the Cobalt camp. Nipissing-O'Brien Ltd. is building a plant with capacity 100 tons daily, start of production being scheduled for mid-year. The plant, employing standard table flotation practice, will be able to handle both silver and cobalt ores. The company is owned by The Nipissing Mines Co. (56.2%) and the M. J. O'Brien interests of Ottawa.

Iron ore deposits of the Belcher Islands in Hudson Bay are to have a thorough test this year. The islands are located about 50 mi from the Quebec mainland and 350 mi north of Moosonee, northern railway terminus at the foot of James Bay. Existence of iron there has been known for many generations, but little exploration has ever been done since in past years the handicap of distance has left capital dubious of its economic potential. This year, however, a well financed program is planned. The islands are held by Belcher Iron Ores Ltd., and the new program is being financed by Consolidated Halliwell Ltd., which is putting up $300,000 for the test.

New Mosher Longlac Mines has started crosscutting on its new level at 2,033 ft, following completion of shaft deepening below the first level at 1,740 ft. Work at the latter horizon has suggested a possible milling rate of 1000 tons daily if the second level shows comparable results. The mine is being established on the westerly extension at depth of MacLeod-Cockshutt Gold Mines' main orebody. MacLeod is at present the sole remaining gold producer in the Little Long Lac camp.

New Mosher owns the idle Hard

SPECIAL TODAY ONLY

FREE MINE TIMBERS

to all users of

★ OSMOSALTS

★ OSMOPLASTIC

★ and M-T-M (Mine Timber Mix)

The Mine Proven Wood Preservatives That Will CUT YOUR TIMBERING COSTS IN HALF Yes, in the future, you can get half of your mine timbers *absolutely free* because OSMOSE Treated Timbers will save you at least half your annual timbering bill. By making all timbering in *permanent places* LAST 3 to 5 TIMES LONGER, Osmose Treated Mine Timbers not only save you the cost of new timbers, but ALSO the high labor cost of making replacements.

There are two ways for you to cut your timbering costs in half: (1) We will supply you with Osmosalts, or Osmoplastic or M-T-M (Mine Timber Mix), and you can TREAT YOUR OWN TIMBER or (2) We can sell you ALL TYPES of Osmose Treated Mine Timbers direct from one of our mills. Either way you get BIG SAVINGS! Write for complete details!

Send for Illustrated Booklet

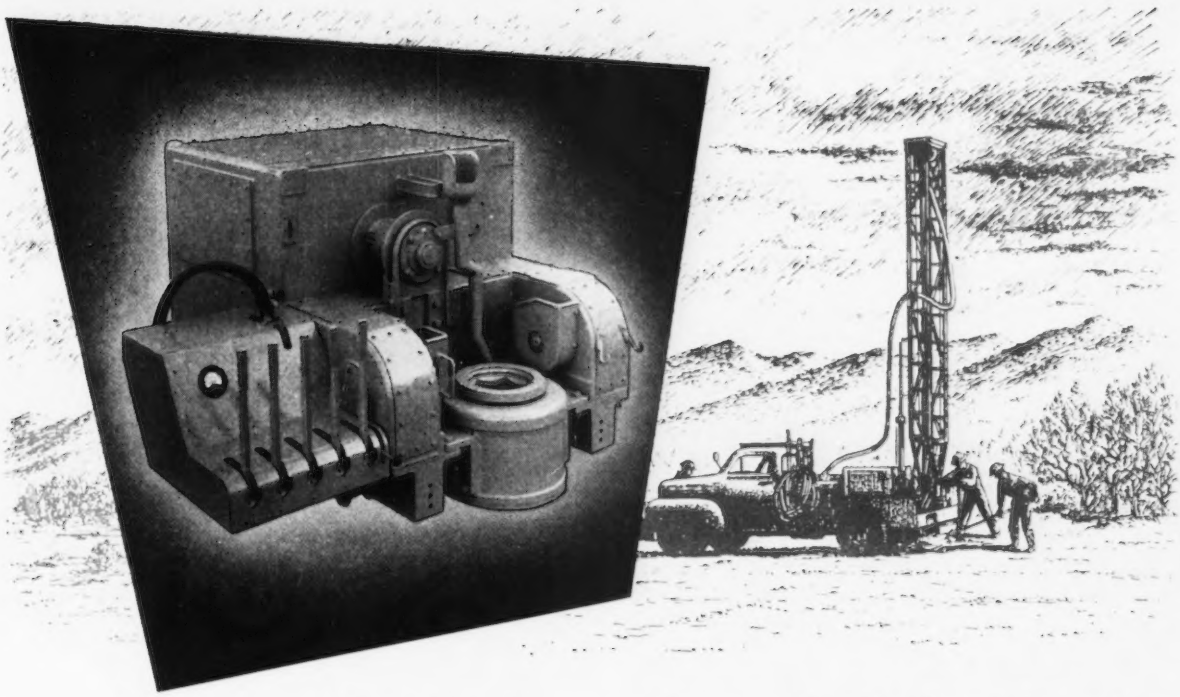
"Force Down Your Operating Cost" is a 16-page book that shows and tells all about the Osmosalts treatment. Write for it today!

OSMOSE

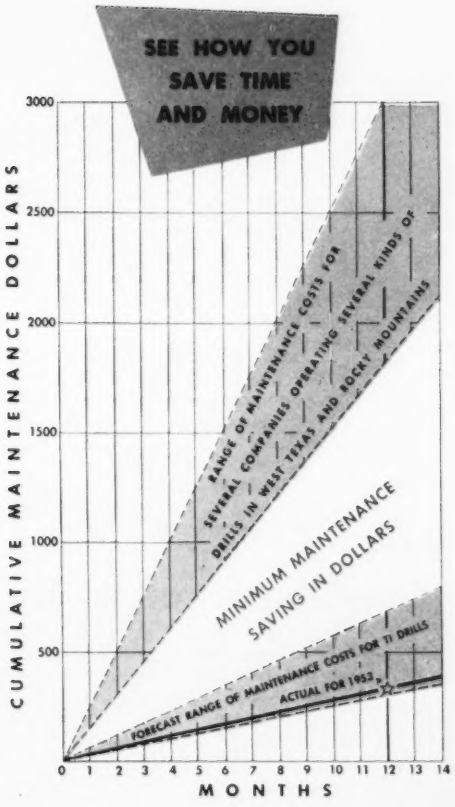
OSMOSE WOOD PRESERVING CO. OF AMERICA, INC.

TOWER #2, CONTINENTAL OIL BLDG., DENVER, COLORADO

Main Office: 980 ELLICOTT ST., BUFFALO 9, N. Y.



Stay in the field . . . stay out of the shop!


SEE HOW YOU SAVE TIME AND MONEY
CUMULATIVE MAINTENANCE DOLLARS
3000
2500
2000
1500
1000
500
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
MONTHS
RANGE OF MAINTENANCE COSTS FOR SEVERAL COMPANIES OPERATING SEVERAL KINDS OF DRILLS IN WEST TEXAS AND ROCKY MOUNTAINS
MINIMUM MAINTENANCE SAVING IN DOLLARS
FORECAST RANGE OF MAINTENANCE COSTS FOR TI DRILLS
ACTUAL FOR 1953

INTEGRATED POWER DRIVE SLASHES MAINTENANCE

SEEING IS BELIEVING and on the chart at left you see *proof* of the low maintenance performance given by the TI Shot Hole Drill with INTEGRATED POWER DRIVE.

This outstanding field performance is due to the INTEGRATED POWER DRIVE, an entirely new concept in drill design with these *exclusive* features. It performs *all* power transfer and control functions in a single *sealed unit* under continuous spray-lubrication. Fluid coupling to the rotary table reduces shock loads. Fluid drive to the "pull-down" applies continuous regulated pressure to the drill string.

The INTEGRATED POWER DRIVE is the big "reason why" your next shot hole rig should be the TI Drill. Write today for more information.

Be sure to see the TI Shot Hole Rig in action at the St. Louis Convention, April 12-15

TEXAS INSTRUMENTS
INCORPORATED
6000 LEMMON AVENUE DALLAS 9, TEXAS

Ontario *(Continued)*

Rock mill, a 600-700 ton plant located several miles to the east. Ore could easily be trucked there from the New Mosher mine; but it now looks as though a larger rate will be justified, in which case the mill would be dismantled, moved to the property, and rebuilt on a larger scale.

QUEBEC

First production results at Opemiska Copper Mines (Quebec) are well up to expectations. The three weeks during which the mill operated in December saw 5,580 tons treated and 1,034 tons of concentrates produced with average grade 28.59% copper, 3.26 oz silver, and 0.28 oz gold. Recovery averaged 84%, mill-heads running 6.15% copper.

With break-in kinks now getting smoothed out, milling rate has been raised to about 350 tons daily and is expected to reach capacity of 400-450 tons by early spring. Recovery, too, is improving and is expected to level off at 95% before long.

Track-laying is at the completion stage on the railway being built by Iron Ore Company of Canada from Seven Islands on the St. Lawrence River to its big iron ore deposits on the Quebec-Labrador boundary. Ballasting of the line will be completed this summer, and the installation of docks at Seven Islands will be completed by July. Ore shipments can thus be confidently expected to start this year. The amount shipped in 1953 won't prove to be large, but tonnage should increase in 1954 to perhaps 2-million tons, and in 1955 to 5-million tons. By 1956 or 1957, when the line's bridges and ballasting have thoroughly settled, the objective of 10-million tons annually should be achieved.

NEW BRUNSWICK

A year after first disclosure of its ore, Brunswick Mining & Smelting Corp. is moving steadily toward production. Volume of its two big orebodies are estimated at 50-million tons above the 1000-ft level, and observers are talking freely of a total ore potential of at least 100-million tons. The original (Austen Brook) orebody is calculated at 18.9-million tons averaging 5.23% zinc, 1.79% lead, 0.3% copper, and 1.74 oz silver; the Anacon orebody at 27.4-million tons averaging 5.28% zinc, 1.88% lead, 0.58% copper, and 1.79 oz silver. Calculations in each instance are to 1000 ft, with no signs of cut-off in evidence.

Before proceeding with mill installation a pilot plant is being built to determine best metallurgical processes. It should be in operation this summer. Tentative plans for the mill call for initial capacity of 4000-6000 tons to produce zinc, lead-silver, and pyrite concentrates. Construction should be under way in 1955-56.

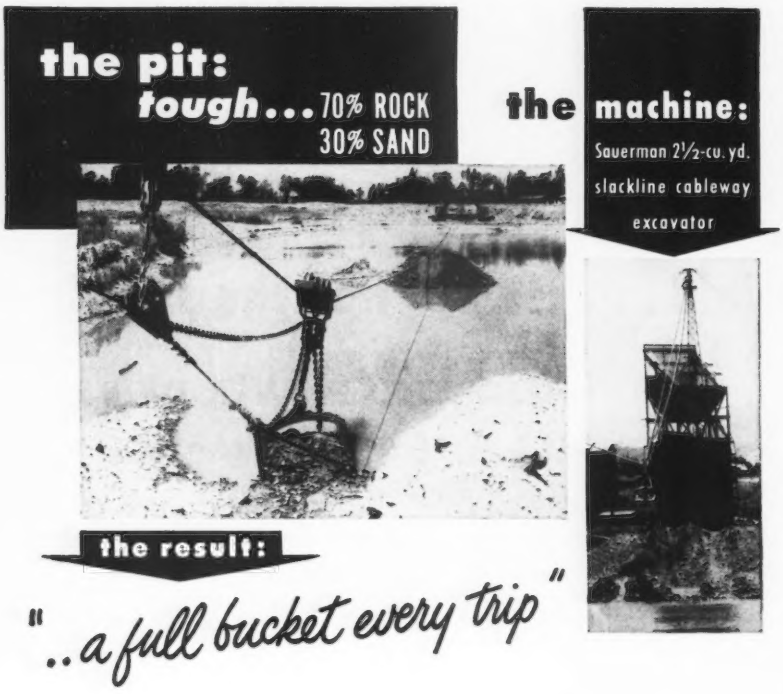
With work in progress for shaft-sinking to 1500 ft, New Larder "U" Island Mines continues to enlarge the indicated volume of its orebodies. Latest surface drilling north of the established ore has indicated a new deposit; length to date is 400 ft with both ends open. Deepest hole showed 21 ft of core length averaging 9.22% zinc, 2.23% lead, 1.95 ozs of silver, and 70% pyrite.

New Brunswick reportedly will see its first tungsten production this spring when operations start at the property for Burnt Hill Tungsten Mines in York Co., at the junction of the Miramichi River and Burnt Hill Creek. The plant will have milling capacity of 150 tons daily; indicated ore is estimated at 40,000 tons with average content 1%-3% tungsten.

BRITISH COLUMBIA

Canada may ask the United States to open new gateways to the sea through the Alaska Panhandle. The corridors would open the way for development of minerals, power and timber areas.

Canadian industrial and mining interests are behind the proposals, and the plan has been discussed in Ottawa and Washington. The idea is also backed by the B. C. and Yukon chamber of mines,



Another actual field report—Helena Sand & Gravel Co., of Helena, Montana, switched to this Sauerman equipment in 1946. It's been in operation since then . . . successfully performing difficult underwater excavation of rock and colloidal sand where other equipment had failed.

Sauerman Slackline Cableways span water, bogs or pits . . . reach far, dig deep, lift and carry loads to hoppers or cone piles. However tough the pit, Sauerman equipment brings in a good load every trip.

With a Sauerman Slackline Cableway, one man—in safe position—operates a single machine . . . does the complete job, quickly, efficiently, economically! Sauerman Slackline Cableways range from ⅓ to 3½ cu. yds.—span distances up to 1,000 feet . . . handle such materials as sand, gravel, clay, peat, ore and rock.

Write today for more information, including these handy field reports and catalog:

FR-216	Easy Excavating in a Tough Pit
FR-213	Cleaning Ponds Without Draining
FR-102	Digging Gravel From a River
Catalog C	Sauerman Slackline Cableways

SAUERMAN BROS., INC. 584 S. Clinton St. Chicago 7, Ill.

SAUERMAN BROS., Inc.

Shaves time from every working cycle

Le Roi Transo TLF-150 Front-end Loader

YOU move more material—faster—at lower cost — with this Le Roi Transo 1½-yard Front-End Loader. It saves you money every minute it's working — and here's why:

You load faster — because . . .
Patented "bucket-rocking action" helps you get a full bucket load within seconds, without tire-spin or undue strain on the loader.

You travel faster — because . . .
Four-wheel drive and low center of gravity provide powerful traction. Torque converter transmits power fast and efficiently. You get in and out in a hurry — in sand, mud, snow, or rocky terrain. Planetary-type reversing transmission cuts reversing time 95%.

You can maneuver the TLF-150 easier and in less space, thanks to power steering, short (84") wheelbase, short over-all length, and small turning radius. Low carrying position of bucket gives operator especially good vision and provides an extra margin of safety.

You dump faster — because . . .
14-foot maximum dumping height and 3-foot reach let you spot loads quickly with pin-point accuracy over high truck tail-gates, bins, hoppers.

Now, don't just take our word for all this. See a Le Roi Transo TLF-150 in action, see how it makes shorter work of your material-handling jobs—how it cuts time and costs. Have your nearby Le Roi distributor arrange a demonstration.

Write for latest bulletin.

TD-12

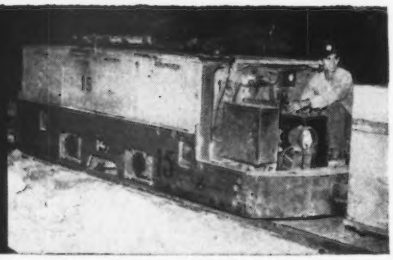
TRANSO DIVISION LE ROI

LE ROI COMPANY

A Subsidiary of Westinghouse Air Brake Co.
TRANSO DIVISION
MILWAUKEE 14, WISCONSIN

Plants: Milwaukee • Cleveland — Greenwich — Dunkirk, Ohio • Coldwater, Michigan

hauling power



that keeps them on the go!

Trouble-free operation, unequalled service life and economy per year of operation have always distinguished EDISON battery power in mine haulage equipment. Because of their steel cell construction, alkaline electrolyte, and an electrochemical principle which is free from self-destructive reactions . . . EDISONS give you the *most failure-free, uninterrupted haulage power* that's possible to obtain!

Ideally suited for mine service, EDISON batteries require no critical charge-rate adjustment, can often be charged directly from d-c lines. And, they can be fully re-charged in six to seven hours, are not harmed by accidental short-circuiting, or reverse charging . . . by freezing or standing idle during shutdowns.

For lowest over-all battery costs, be sure to get all of the facts and latest quotations on EDISON batteries as applied to your operations. For an EDISON field engineer's call or a copy of Bulletin 3826, simply write Edison Storage Battery Division, Thomas A. Edison, Incorporated, West Orange, New Jersey.

Most dependable power... lowest over-all cost you get both with an EDISON

EDISON

Nickel · Iron · Alkaline

STORAGE BATTERIES

EDISON ALSO MAKES THE FAMOUS "V.P." VOICEWRITER AND THE TELEVOICE SYSTEM

British Columbia *(Continued)*

Vancouver, British Columbia. Governor B. Frank Heintzleman of Alaska also is interested.

To avoid the costly airlift employed last winter in preparing for exploration of the copper body on Granduc glacier in northern British Columbia, experiments are underway aimed at establishing a ground route to the property.

Transport experts are trying out snowmobiles and light tractors for the 20 mi route from the old Silbac Premier Mine to the glacial property of Granduc Mines Ltd. The Silbac Premier is connected by road to Stewart on the Portland Canal. This is a joint project of Granby Consolidated Mining, Smelting and Power Co., and the Newmont Mining Corp.

Last year, some 200 tons of equipment for mining were airlifted to Granduc glacier. Objective this year is a longer work season. About 400 tons of freight must be moved. Development work is scheduled for an early start this spring.

Officers of the B. C. District, International Union of Mine, Mill & Smelter Workers, Vancouver, have charged that employers in British Columbia's mining industry are using rising unemployment figures to intimidate workers still on the job.

A report to the organization's 11th annual convention stated: "A substantial number of workers in our industry have been caught in layoffs, and layoffs are being accompanied by attacks on the standards of those still employed.

"Dismissals for little or no reason have become the order of the day. The employers are using unemployed lists to intimidate those who are still on the job."

The 40 delegates attending the three-day parley were told that the organization "will not tolerate employer attempts to drive our membership back to conditions that existed prior to 1943."

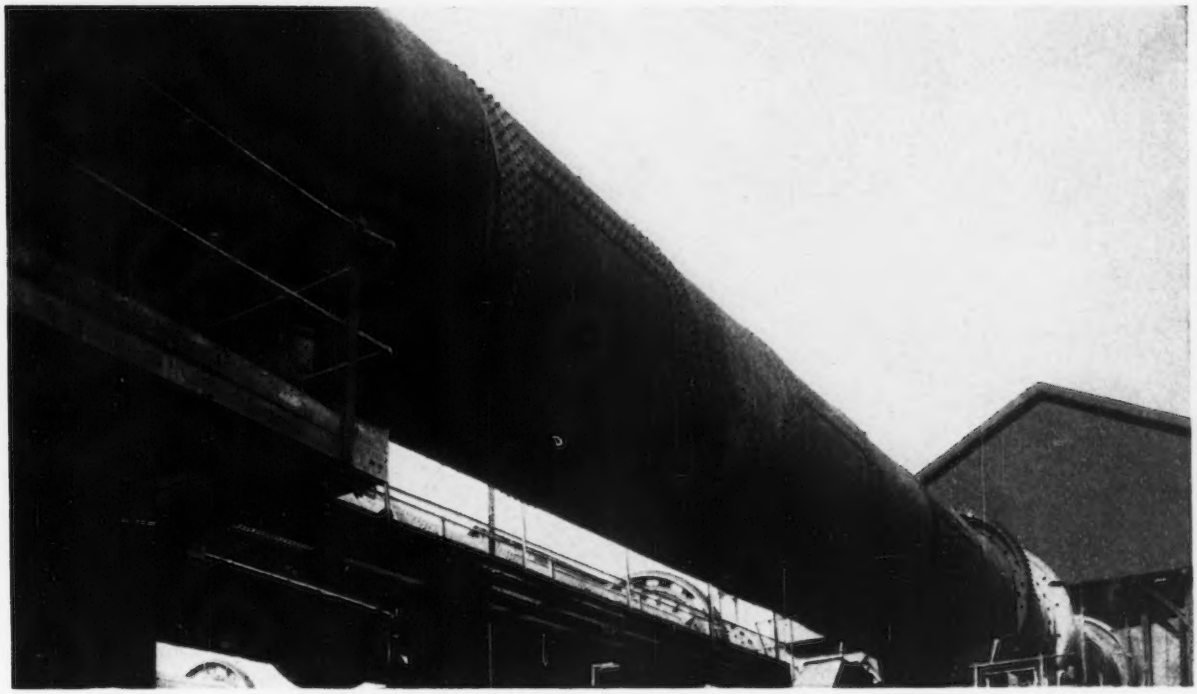
MANITOBA

Preliminary estimate of Manitoba's mineral production for 1953 indicates that the value of metals will show a decline from $15,936,991 in 1952 to $14,517,792 for 1953. Industrial minerals are estimated at $9,627,414, compared with $8,938,755 for 1952. Oil production for the past year is valued at $1,526,751. Total mineral production for 1953 is estimated at $25,671,957, compared with $25,105,047 for 1952.

IN AFRICA

Lithium salts are to be exported from Southern Rhodesia to Britain and the United States this year. This will be the first time that lithium salts have been manufactured in exportable quantities in Africa. Until now, only small quantities

ORIGINAL WAELZ KILN
built in 1929 by Vulcan for
The New Jersey Zinc Co. (of Pa.)



Illustrated above is an original 10′ x 140′ kiln that was installed in 1929. It is used for the treatment of low grade zinc ore using the WAELZ process. At the time of its installation parts of the kiln included the older type supporting and thrust bearings and drive mechanism. This kiln is in daily operation after nearly 25 years of continuous service, and it is still producing its share of the product involved.

Proved Performance of a Vulcan Rotary Kiln is what the above shows . . . and this performance is also the result of fine co-operation between the engineering personnel at Vulcan and the engineering personnel and operators of The New Jersey Zinc Company (of Pa.).

This great Company along with many more throughout the United States and the world have come to regard Vulcan equipment as Good . . . Dependable . . . Equipment. If any information regarding Rotary Kilns is needed, The Vulcan Iron Works and its 105 years of experience is ready and able to serve you. Write for Bulletin No. A-442 today.

Any information on items listed below will be sent to you immediately:

- Rotary Kilns, Coolers and Dryers
- Rotary Retorts, Calciners, Etc.
- Improved Vertical Lime Kilns
- Automatic Quick-Lime Hydrators
- Briquetting Equipment
- Open-Hearth Steel Castings
- Heavy Duty Electric Hoists
- Self-Contained Electric Hoists
- Cast-Steel Sheaves and Gears
- Diesel Locomotives
- Electric Locomotives and Larrys
- Steel Plate Fabrications
- Hydraulic Presses

VULCAN IRON WORKS

NEW YORK OFFICE
50 CHURCH ST., N.Y., N.Y.

WILKES-BARRE, PA., U.S.A.
ESTABLISHED 1849

CABLE ADDRESS
"VULWORKS WILKESBARRE"

Keeping pace with industry for 100 years

This early "Roots" catalog, published in 1879, offered only Rotary Positive Blowers. That was our exclusive business at that time—25 years after the invention of the rotary positive principle by Francis M. Roots.

Today, because of the greatly increased use of gas and air for industrial purposes, it takes a great many bulletins and booklets to describe our expanded line of products. As new ideas, new developments are utilized in industrial processing, Roots-Connersville keeps pace with new equipment to handle gas and air most effectively and economically. And that is still our only business.

Into these bulletins, any of which are yours for the asking, are condensed our 100 years of experience in building such equipment, from the first Rotary Positive Blower in 1854 to our latest 1953 development, the Spiraxial Compressor. They describe R-C products which are up to date in design and construction, to match specific needs of industry.

We suggest that when your business has a job of handling gas or air, you consult the exclusive specialist for 100 years.

Reg. U.S. Pat. Off.

BLOWER BUILDERS SINCE 1854

ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.
354 Washington Ave. • Connersville, Ind.

Africa *(Continued)*

of ore have been mined and exported in bulk.

The plant has been erected at Gwelo and was designed and built in Bulawayo, after three years of research which resulted in a pilot plant being brought into operation last year which gave successful results.

The last gold mine in the town of Bulawayo, Southern Rhodesia, has closed down. When the five-stamp battery at the Mamba Mine stopped, the last strand snapped in a pattern of sound once as familiar as that of aircraft overhead is today.

Over the past 20 years, one-by-one, the small workings have sunk into inactivity and been forgotten.

The Mamba was one of 300 small mines which the Government equipped for veterans of World War II. A 200-ft vertical shaft was sunk and lined with concrete and an incline of 340 ft put down by the Government. The original owner recovered some 60 oz of gold a month from the upper levels, but then pyritic reefs were encountered.

At one stage, it nearly became a scheelite mine, but continued as a gold mine when the price of scheelite fell from $4,200 to $1,700 a ton. Then it was beaten by the rising cost of gold mining and the falling away of the gold premium.

Water in the Kimberley Open Diamond Mine is rising at the rate of 12 ft a year. In 30 years it is expected that one of the most famous sights in the work "The Big Hole" will have disappeared and in its place will be a lake some 250 ft below the surrounding country.

Although diamond sales through the Central Organization of De Beers Consolidated Mines decreased by some $24-million to just around $173-million for the whole of last year, the last two quarters of 1953 saw the figures on an upward trend again. Gem and industrial sales for the September quarter amounted to more than $40-million and for the December three months to more than $44-million.

Fortune has smiled on one digger at the recently opened miniature diamond mines at Bloemhof (reported last month). A 72-carat stone has been found. Officials state that if it turns out to be flawless, it can fetch around $560 a carat or about $39,000.

In the prospecting operation in the area previous to the "rush," one 20-carat stone which sold for $4,500 was found.

Diggers are now starting to talk about the prophecies of "Siener" van Rensburg, an old Western Transvaaler with a great reputation as a seer and interpreter of dreams, in which he predicted that a stone would be found near Bloemhof which would beat both the Cullinan and Jonker diamonds in weight. The Cullinan weighed 3,125 carats and the Jonker, 726 carats.

Two new uranium producers came

High voltages call for U. S. Holdtite® Friction Tape

THIS MINE in Arizona uses "U. S." tapes exclusively. The electrical cables that feed power to this great shovel are spliced with U. S. Holdtite Rubber Tape for insulation and U. S. Holdtite Friction Tape for high strength and mechanical protection. High voltages in copper and metal mining require rubber tapes with high dielectric strength, strong adhesion and easy fusing. That's U. S. Holdtite Rubber Tape—the *quality* tape that exceeds A.S.T.M. specifications. Combine it with the *quality* U. S. Holdtite Friction Tape and you have a high quality splice. Holdtite Friction also exceeds A.S.T.M. specifications.

United States Rubber Company makes a complete line of electrical and splicing tape. Simplify your purchasing by buying "U. S." tapes from one of our selected distributors, or get in touch with any of our 25 strategically located District Sales Offices or write the address below.

"U. S." Research perfects it.
"U. S." Production builds it.
U. S. Industry depends on it.

US RUBBER

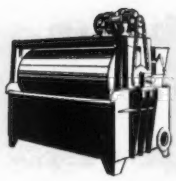
UNITED STATES RUBBER COMPANY
MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting

WET CONCENTRATION?

. . . magnetic concentration of magnetite, magnetic taconite, roasted limonite or hematite? Recovery of medium in a heavy media plant? Preliminary purification of dredged or beach sands?

If these are your problems, you'll want to talk to the Dings people about Wet Concentration. Learn the reasons for, and the operation of, Dings wet belt and wet drum magnetic separators, both electric and non-electric Alnico types—and learn about the new Dings super high intensity models with nearly double the capacity of older units. *Call or write for further information.*



DINGS DRUM TYPE SEPARATORS

DINGS TYPE HM SEPARATOR

Dings

DINGS MAGNETIC SEPARATOR CO.
4716 W. ELECTRIC AVE., MILWAUKEE 46, WISCONSIN

Wet and Dry Concentrators . . .
Tramp Iron Magnets . . .
Magnetic Detectors . . .
Magnetic Tube Testers . . .
Magnetic Drill Extractors . . .
Laboratory Separators

WC154

Magnetic Separation Leader for over Fifty Years

Africa *(Continued)*

into operation during the last quarter of 1953—Western Reefs and the Stilfontein G.M.—both in the Klerksdorp district. Western Reefs reported a maiden profit of $650,000 and Stilfontein $110,000. Neither plant of course is anywhere near its rated production. This brings the number of gold mines recovering uranium to five. The current year will see another 10 joining them, including five Free State properties and the biggest plant of all, at Randfontein Estates, for which over $23-million has been provided from loan funds. When all 23 scheduled mines get into full stride, annual earnings will be $100-million.

A deposit of euxenite has been discovered in the Northeastern Cape Province. Prospecting work is underway.

South African Bureau of Standards has appointed a sub-committee to investigate ways and means of establishing a Government grading scheme to re-establish confidence in the quality of S.A. asbestos overseas. As reported earlier, the boom in this country has completely collapsed, and apart from one or two producers, the market has virtually vanished.

Railings of chrome from Southern Rhodesia increased from 295,000 tons in 1952 to 498,000 tons last year—within 2,000 tons of the target figure of 500,000 tons annually. Nevertheless, some 400,000 tons are still lying on the stockpile at Selukwe.

It is not thought that the rate can be speeded up until the new Bannockburn-Pafuri rail link is completed, which will provide an outlet through Lourneco Marques. It has been announced by the new Southern Rhodesia Prime Minister, R. S. Garfield Todd, that extensive prospecting of large copper deposits is taking place in the Colony.

Transvaal and Orange Free State Chamber of Mines has announced estimated uranium profits of Transvaal mines last year as follows: £138,304 in the first quarter, £299,123 in the second, £509,421 in the third and £881,219 in the last.

IN LATIN AMERICA

BOLIVIA

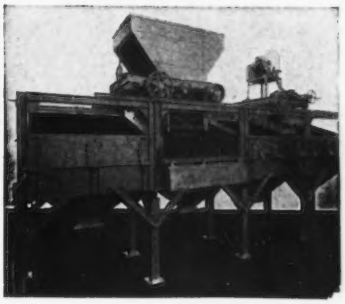
Two Atomic Energy Commission experts have arrived in La Paz to aid the search for radioactive minerals. It was announced that the AEC representatives will remain in Bolivia a year.

The joint commission will have a central office at the Ministerio de Minas in La Paz and branch offices at Cochabamba, Oruro and Potosi.

A commission of four West German engineers of the Lurgi Chemical Machinery Co., Frankfurt, and the Friedrich

Smelting on Site
with
MACE Furnaces
and
Sintering Hearths

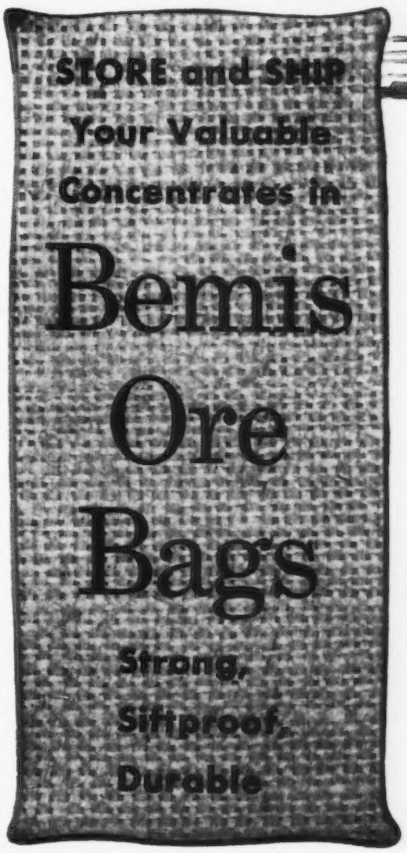
Saves high transportation and treatment charges on your ores and concentrates.



Wire or write for new catalog.

Standard sizes 5 to 250 tons capacity. Working scale tests on ton lots or larger made at our Denver Smelter. Send us an analysis for preliminary report.

The Mace Company
FIRE CONCENTRATION METALLURGISTS
2763 BLAKE STREET, DENVER 5, COLO., U.S.A.



Compare Bemis Waterproof (*laminated-textile*) Ore Bags with the shipping containers you are now using . . . for economy, durability, convenience. Make comparative tests. Send for details and sample bag.

BEMIS BRO. BAG CO.
General Offices
St. Louis 2, Mo.

Bemis Bro. Bag Co., Waterproof Dept.
408-E Pine St.,
St. Louis 2, Mo.

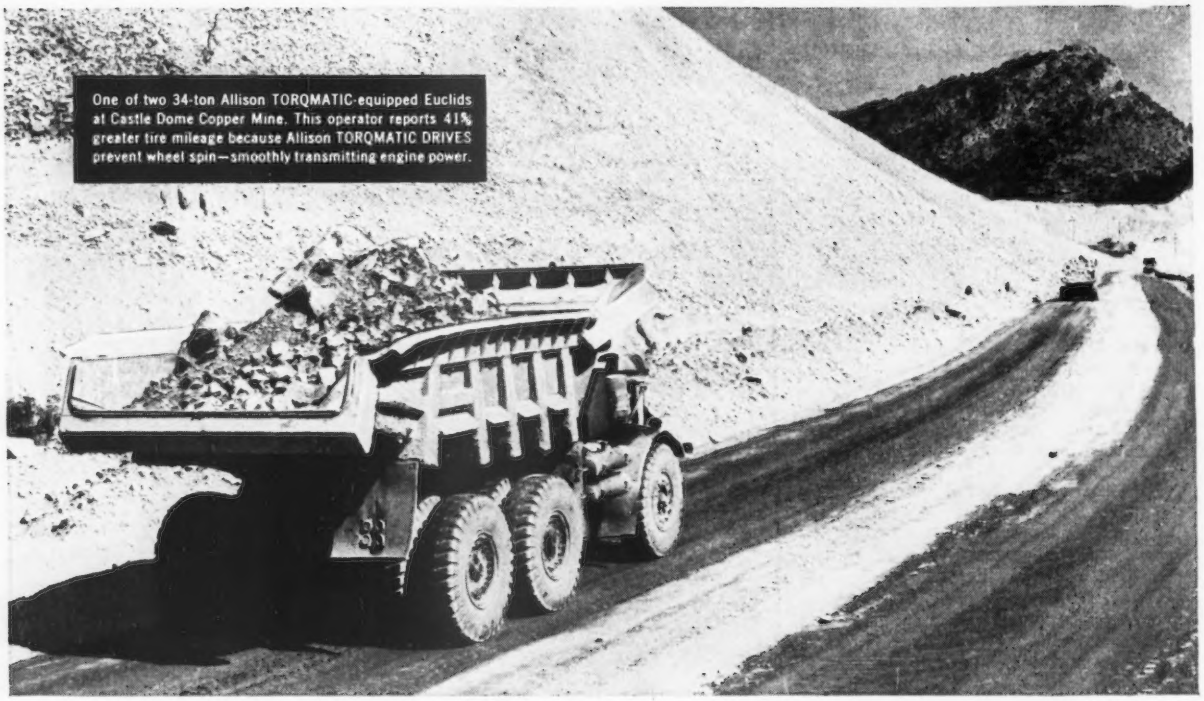
Send sample Bemis Ore Bag for _____ (TYPE OF ORE) and detailed information.

Name _____

Company _____

Street _____

Zone _____ *State* _____



One of two 34-ton Allison TORQMATIC-equipped Euclids at Castle Dome Copper Mine. This operator reports 41% greater tire mileage because Allison TORQMATIC DRIVES prevent wheel spin—smoothly transmitting engine power.

"41% longer tire life"

Castle Dome Copper Company reports it gets 17,000 miles per tire on off-highway trucks equipped with Allison TORQMATIC DRIVES compared to 12,000 miles per tire on mechanical-drive units. But increased tire life is only part of the story — the firm also reports the TORQMATIC-equipped "Eucs" have better availability and production records.

This operator runs a fleet of 12 trucks —2 TORQMATIC-equipped "Eucs" and 10 mechanical-drive units — hauling 390,000 tons of ore and overburden per month up 8% grades on mile-long runs. The "Eucs" average 25.3 trips per 8-hour shift, each hauling about 53,000 tons per month.

TORQMATIC DRIVES smoothly transmit engine power—help prevent wheel spin that can quickly strip the tread from a tire. There's no clutch pedal to push and only three forward gearshifts—instead of the usual 7 or 10 — handle all loads and grades. The *matched* converter-transmission team balances engine power and load demand, absorbs harmful drive-line shocks, prevents damage to drive-line components, helps stop engine lugging.

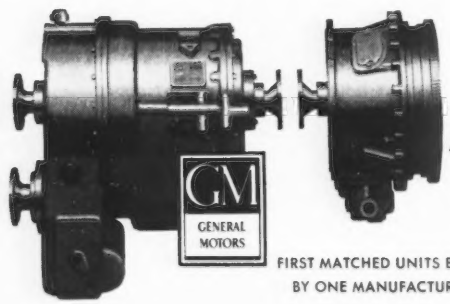
You, too, can cut your operating costs by specifying Allison TORQMATIC DRIVES the next time you buy. Ask your equipment dealer, manufacturer or write:

Allison Division of General Motors
Box 894M, Indianapolis 6, Indiana

ALLISON TORQMATIC DRIVES

Unbeatable Team for Maximum Operating Economy

- **Cuts** driver training costs
- **Quick-Shifts** at full throttle with fingertip hydraulic control
- **Holds** power to load at all times — no clutch pedal to push—no gearshift guess
- **Reduces** maintenance costs by absorbing shock — eliminates engine lugging — prolongs equipment life
- **Only** torque converter-transmission team designed to work as a *unit* and built by one manufacturer



FIRST MATCHED UNITS BUILT BY ONE MANUFACTURER

Allison

TORQMATIC DRIVES

COMPACT, EFFICIENT HYDRAULIC DRIVES FOR CRANES • TRUCKS
TRACTORS • SCRAPERS • SHOVELS • DRILLING RIGS

Bolivia *(Continued)*

Krupp AG, Essen, are visiting La Paz, to study the technical and economic conditions for setting up a tin smelter in Bolivia.

The engineers have been invited by the Bolivian Corporation Minera state mining company and were expected to spend two months in Bolivia. They were slated to complete their preliminary study late in March.

The foundry should have an annual capacity of about 20,000 tons of tin, they said.

PERU

Sociedad Electroqui mica has installed a plant in Arequipa in southern Peru for producing 200 tons a month of refined nitrate. The plant has facilities to increase capacity to 1000 tons monthly.

This company estimates that there is enough nitrate in the deposits to last 30 yr at maximum plant capacity. The mines are in the Pampa de Tambillo; ore is hauled by truck to Arequipa.

Republic Steel Corp. has taken an option on a sizeable area south of the Marcona iron deposits in the region known as Acari. A diamond drilling program is underway to ascertain extent of ore deposits.

Mines in Acari are vein deposits of ultra high grade with few impurities. Surface and geological examinations thus far reportedly have been encouraging.

CHILE

Negotiations on revisions in tax and exchange systems and other conditions for the American copper companies in Chile are likely to be protracted, according to usually well informed circles in Santiago. Talks are still going on between representatives of the Chilean Government and the Anaconda and Kennecott companies but the complexity of the points under discussion and the uncertain position of copper in the world markets is thought to preclude any quick settlement.

Agreement, if and when reached, will be embodied in a bill to be introduced in the Chilean Congress. However, Congress has now recessed until early March and no new copper bill can be discussed at least until then, unless Congress is specially reconvened.

Usually well informed sources say that a draft bill is in existence, which embodies the main points of the new Chilean government policies. The draft is understood to provide for a fundamental reform of taxation for the big copper producers, who would receive certain concessions in return. Taxes would be based on a progressive scale, diminishing proportionately to increases in production.

The draft bill is also believed to call for modifications of exchange rates applicable to the copper companies where-

Detachable, carbide Rok-Bits; Chisel or 4-point—gage sizes, 1¼" to 4".

TIRED OF *HIGH BIT REPLACEMENT COST?*

ROK-BIT HAS THE MONEY-SAVING ANSWER

Carbide Rok-Bits® stand the rapid-fire battering of today's rock drilling longer, give greatest service life at lowest cost-per-foot drilled. Have unique NON-RIFLING balanced design. Minimize steel breakage. Reduce bit replacement. Can you afford to waste manpower on less efficient bits? Write plant nearest you for "Guide to Better Footage, Lower Drilling Costs."

Leading mines everywhere depend on Rok-Bits for faster ore drilling—much, much lower bit costs.

Brunner & Lay, Inc.
9300 King St., Franklin Park, Illinois, Est. 1882

Affiliated plants and warehouses

Brunner & Lay Rock Bit Corp. 2514 E. Cumberland St. Philadelphia 25, Pa.	Brunner & Lay Rock Bit Corp. 350 Depot St. Asheville, N. C.	Brunner & Lay, Incorporated 2425 East 37th St. Los Angeles 58, Calif.	Brunner & Lay, Inc. 150 Leslie St. Dallas, Texas

Why Search for

URANIUM

with a Horse and Buggy?

THE *New* ROYAL SCINTILLATOR

- ★ Is more sensitive than any other Scintillator or Geiger Counter
- ★ Easily detects deeply buried Uranium deposits from ground or air
- ★ Produces results never before possible
- ★ Can be used for oil field surveys
- ★ Made by the manufacturers of the famous "Scintillator"

Dealers Wanted

Send for free complete catalog of Geiger Counters, Scintillators and metal locators including the new "Special Scintillator" priced at only $299.50

PRECISION RADIATION INSTRUMENTS, INC.
2235 EJR So. La Brea Ave., Los Angeles 16, California
Please send Free Catalog.
NAME_____ TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE__ STATE_____

WORLD'S LARGEST MANUFACTURERS OF PORTABLE RADIATION INSTRUMENTS

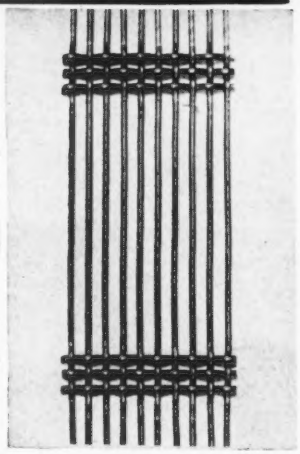
RUGGED WIRE SCREENS FOR TOUGH MINING TASKS

EXTREME RESISTANCE TO SULPHUR

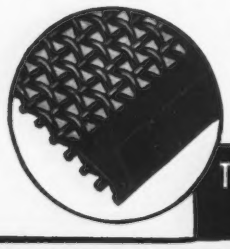
CORROSION — ABRASION — FATIGUE

Cleveland Wire Cloth and Manufacturing Company, producing a complete line of woven wire screens, serves the major coal and mining centers of the world. These well-built, durable, heavy-duty screens are available in stainless steel, monel and many other non-blinding commercial metals.

Their high percentage of open areas delivers a high-through tonnage. "Cleveland" Wire Screens are designed for all types of mechanical and electrical vibrators.



FOR VIBRATORS



Ask for Bulletin No. 6 for details on heavy-duty wire screen sections for vibrators. Available in many types of hooked edges.

THE CLEVELAND WIRE CLOTH & MFG. CO.
3574 E. 79 STREET · CLEVELAND 5, OHIO

WORLD WIDE ACCEPTABILITY

GREENSBURG storage battery LOCOMOTIVES are the modern "workhorses" of mining and construction industries in many of the far-flung corners of the world. Users from Hawaii to Honduras, from Algiers to Alabama like their strong, simple construction . . . their extremely low upkeep cost . . . their longer battery life! All locomotives are custom-designed to meet your most exacting requirements. For a more efficient storage battery locomotive use Greensburg. Write TODAY!

2 TON
GREENSBURG PONY

GREENSBURG MACHINE COMPANY
102 STANTON ST., GREENSBURG, PA.

Chile *(Continued)*

by the new "single rate" of 110 pesos to the U.S. dollar would replace the present 19·37 pesos rate which is used to convert the proceeds of the companies' sales of copper abroad.

Secretary for Mines Senor Cuevas Mackenna resigned and has been replaced temporarily by the Secretary for Agriculture Señor Hales. Much regret has been felt in Chilean mining circles at Señor Cuevas retirement since he was the author of a bill now being discussed in Congress which if approved will be a real help to the small and medium size miners. The bill calls for auctioning the so called "dollar certificates" as a means to raise the low value at which the miners have to dispose of their dollars and which has been fixed officially at 110 pesos.

Señor Cuevas, while Minister for Mines, discussed during several meetings with the officials of Anaconda Copper Mining Co., the new agreements to be arrived at between the government and the American companies with regard to the new status for copper. These talks are now being carried on between the Secretary for the Treasury and Economics on behalf of the government and the American companies' officials. As soon as they are finished, a bill will be drafted by the government and sent to Congress for approval.

A point of great interest as far as Chile is concerned, is whether the productive capacity of the big Chilean copper mines, which is falling behind those of the United States, Rhodesia, Canada, Peru and other copper producing countries, will be increased. This will surely depend on whether the American companies get better terms than those they are receiving at present.

The Patagua copper flotation mill of S. Hochschild & Co. near La Ligua, Aconcagua Province, is having its capacity doubled to 200 tons of ore per day. High grade iron ore is being shipped to Japan from the port of Coquimbo. Recently a boatload of 10,000 tons of ore was embarked at that port.

Cia. Minera Aysen, the most southern of all Chilean metal mining operations, owning lead, zinc and copper mines in Aysen Province, is building a Scotch hearth type of furnace to smelt its lead concentrate and high grade lead ores.

Until now the lead concentrate had been exported but the zinc concentrate is being stockpiled until the price of zinc goes up. Freight from the Aysen mines, which are located on the shores of Lake Buenos Ayres, to the coast is very high.

Cia. Minera Delirio de Punitaqui, Coquimbo Province, is increasing the capacity of its flotation mill by 50% and building a cyanidation section to treat the gold ores found in the upper levels of the vein and which do not carry any copper.

Government has decided to create a Su-

Attention
Flotation & Wet Mineral Dressing Operators

GUAR GUM

the amazing new natural colloid is now freely available for immediate shipment in carloads or LCL lots

JAGUAR* is now being used successfully as a

CONDITIONING REAGENT
DEPRESSANT
FLOCCULANT

- *Extremely Efficient*
- *Very Low Unit Cost*
- *Easy to Use*

JAGUAR*

is

STEIN SH HALL

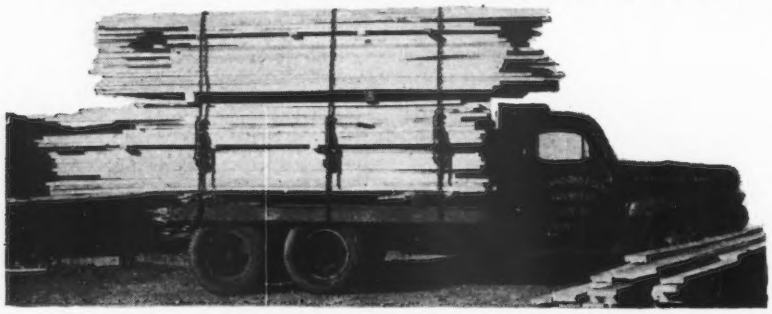
GUAR GUM

*Trademark

SEND FOR FREE SAMPLE

JAGUAR DEPT. EMJ-3
Stein, Hall & Co., Inc.
285 Madison Avenue, New York 17, N. Y.
Please send me a .....lb. free sample of
STEIN, HALL'S JAGUAR.
NAME.....
TITLE.....
COMPANY.....
ADDRESS.....ZONE.....STATE.....
CITY.....

There's never been anything like



LAUGHLIN'S
Load Binder

BRAND NEW
new design, new economy,
new convenience.

MORE USEFUL
one binder does the work of two.

GREATER SAFETY
drop forged strength plus non-slip locking.

HERE'S THE STORY:

The new LAUGHLIN LOADBINDER is a sturdy, drop forged, heat treated steel unit available in two sizes, each of which can use four different hook sizes. You buy only one handle assembly, attach two Laughlin clevis grab hooks to fit your chain. Change hooks in a jiffy with pliers or screwdriver.

Stronger, too, because swivel tongue swings on end of slotted jaw, won't spread under strain. Safe, because a positive cam lock action keeps it shut.

#1 Binder: U.T.S. 22,000 Lbs. Hook sizes: ¼", 5/16", 3/8", 7/16"

#2 Binder: U.T.S. 32,000 Lbs. Hook sizes: 3/8", 7/16", ½", 5/8"

Laughlin Clevis Grab Hooks are stocked by leading Industrial Supply, Wholesale Hardware, Oil Field, and other Distributors. Ask your distributor for information about the new loadbinder, or write for 4-page folder. It has complete description, specifications and users' comments.

For a complete listing of 1500 types and sizes of Laughlin wire rope and chain fittings, ask also for our Catalog 155.

THE THOMAS LAUGHLIN COMPANY
36 Fore Street, Portland, Maine

Chile *(Continued)*

pervisory Council to direct and coordinate all geological investigations in Chile. Until now such work has been done individually by the Chilean Bureau of Mines, the Mining Bank, the Paipote smelter, the Nitrate and Iodine Superintendance and the Development Corp. Chairman of the new Council will be the Secretary for Mines or the Director of the Bureau of Mines.

Geophysical and geochemical methods, little used in Chile until now, will be employed as well as airborne methods. CORFO (Chilean RFC) will carry out the work on general geology, geophysics and geochemical methods, the Mining Bank will look after the work related to finding and developing mines for the Paipote smelter.

Export of iron ores to the United States from the small but high grade Chilean iron deposits is becoming increasingly difficult because of high costs. To make a profit on this class of mining, it will be necessary to modernize the exploitation.

Exporting the same grade of iron ore to Western Germany is still profitable because the rate of exchange with that country is 145 pesos to the dollar while only 110 pesos with the United States. The new flotation and cyanidation mill which the Mining bank is building at Illapel, Coquimbo Province, will be ready to operate by mid-1954. Each section will have a daily capacity of 50 metric tons.

MEXICO

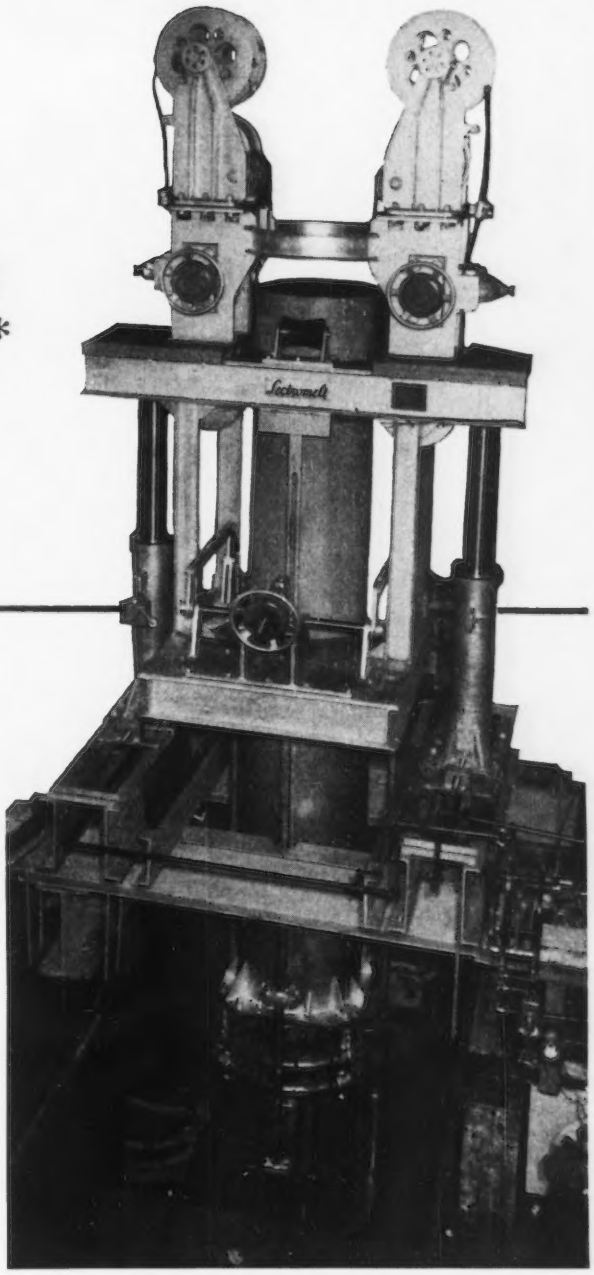
Mining, hard hit by low prices for most of its exportable products, was cheered, somewhat, by the assurance of John Foster Dulles, Jr., the U.S. Secretary of State's son, speaking as deputy general manager of Peñoles, at its Monterrey, Nuevo Leon, headquarters, that the price situation is transitory. He sees the world metal-mineral market normalizing before long, with benefits for Mexico and discounts predictions in Mexico that poor prices will eventually kill mining, the Republic's top industry.

Mexican Sulphur's plant at San Cristobal, Vera Cruz (see *E&MJ*, February 1954 p 194), has reached a 500-ton daily production. But the company's plan to ship this sulphur to the U.S. for refining is opposed by Mexican labor which argues that as the sulphur is mined in Mexico it must be refined in Mexico.

American Smelting and Refining Co. has been advised by Lic. Gilberto Loyo, Secretary of National Economy, to resume working promptly its La Dolores silver mine, Angangueo, Michoacan, closed since last Apr. 25 when an explosion and fire killed 33 miners and injured 45 others. Secretary Loyo said Ministry experts pronounced the mine workable.

The Labor Ministry will specify precautions that must be taken for working La Dolores. Loyo asked the Company to

You can equip your smelting furnaces with Lectromelt* Self-Baking Electrode Gear...



Lectromelt Self-Baking Electrode Gear gives you these advantages:

1. The complete structure is supported by two I-beams just above the furnace roof, resulting in lower and lighter building construction above.
2. No movable parts required at clamp level such as bolts, nuts, springs, etc., which can be damaged by flame.
3. Remote-control clamping device allows quick and simple electrode adjustment and easy replacement of clamp shoes.
4. Pressure ring exerts uniform pressure and holds electrode circular.
5. Four cable supports provide minimum distortion of casing at clamp.

For a further listing of Lectromelt Self-Baking Electrode gear advantages, write Pittsburgh Lectromelt Furnace Corporation, 322 32nd Street, Pittsburgh 30, Pennsylvania.

Self-Baking electrode gear for a ferromanganese smelting furnace on Lectromelt's erection floor. Testing completed, it's ready for shipment.

Manufactured in . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... Lectromelt

Thermoid Hose designed specifically for use in mines

Thermoid designs and manufactures many types of hose built to give longer service and lower operating costs in a wide variety of specific applications. These 3 are ideal for rugged mining work:

THERMINE — Heavy duty air hose, mandrel-built with oil resistant tube reinforced by high tensile yarn. Smooth, abrasion-resistant cover.

THERMOFLEX — Mandrel-built air hose for extreme service and direct connection to compressors. Smooth, black, abrasion-resistant cover.

#325 SUCTION HOSE — For heavy duty water suction service. Smooth bore, wrapped hose with heavy wire reinforcement, durable cotton duck plies.

Thermoid research is responsible for new, better construction that makes Thermoid hose more durable . . . easier to handle. Your Thermoid Distributor can help you select the hose best suited for your requirements. Or if you prefer write direct for catalogs.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

Mexico *(Continued)*

fully inform and allow all necessary facilities to Government accountants who are to ascertain whether or not mining in the Angangueo zone is profitable. Three accountants of recognized competence and integrity are to be named for the inspection by the Economy, Finance and Labor Ministries.

Construction of a modern ore handling pier has been started at Tampico by the Marine Ministry, General Rodolfo Sanchez Taboada, Secretary. The Tampico Stevedores Union is doing the building, under contract. The Ministry has paid 10% of the 12-million-peso ($1,380,000) cost of the job which, General Taboada announced, is to be finished within a year. The pier will facilitate sea movements for mining, he said.

The Dolores Trompeta and Padre Flores gold-silver mines in San Luis Potosi are being conditioned for resumed work by the Mining Stimulation Commission. The mines were abandoned in 1903 because steam pumps of that time were inadequate to keep the workings dry. Modern methods can so unwater the mines that they will be kept workable, the Commission said.

(For other news of mining in Mexico, see p 98.)

Two gold and silver mines have been re-opened in the Guanajuato area of north central Mexico—one of them by a Government entity.

The Nueva Luz mine near Mineral de Valenciana is now being pumped out preparatory to re-opening by Fomento Minero S. A., which is backed by the Mexican government in an effort to develop mining. The Nueva Luz is said to have one of the deepest shafts in Mexico, running to a depth of 680 meters (about 2100 ft).

Another mine in the area, opened by private interests, is the Lourdes Mine, which will be operated by the Compania Industrial Commercial S. A. of Ciudad Juarez. Spokesmen say they expect a kilo to a kilo and a half of silver per ton and possibly 30 grams of gold per ton.

BRAZIL

Existence of important limestone deposits in the Agua Quente Range at São Fidelis in the State of Rio de Janeiro have been verified by the Geology and Minerology Dept. of the Ministry of Agriculture.

The limestone has a magnesium content sufficient for industrial purposes and reserves have been estimated at 10-million tons, which would permit installation of a cement factory in the locality.

State of Mato Grosso has signed a contract leasing the manganese mining rights of the Urucum deposits to "Sociedade Brasileira de Mineracao Ltda," a Brazilian company controlled by the Chamma group.

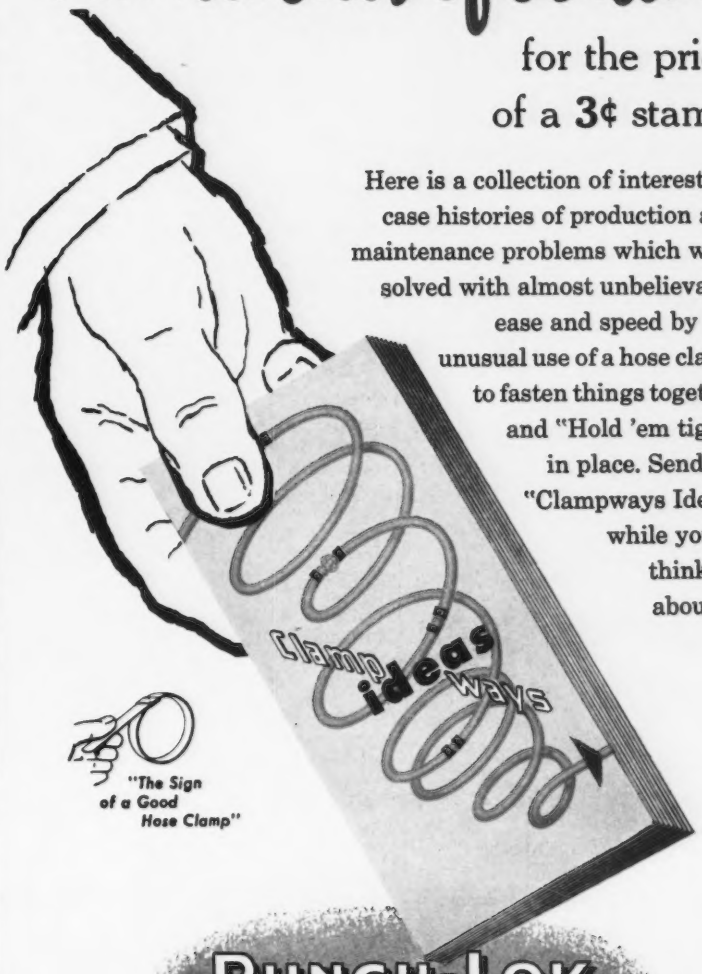
This company, in turn, entered into a contract of purchase and sale of manga-

ideas...worth

hundreds of dollars

for the price of a 3¢ stamp

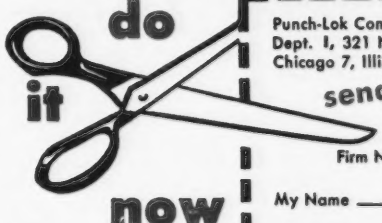
Here is a collection of interesting case histories of production and maintenance problems which were solved with almost unbelievable ease and speed by the unusual use of a hose clamp to fasten things together and "Hold 'em tight" in place. Send for "Clampways Ideas" while you're thinking about it.*



"The Sign of a Good Hose Clamp"

PUNCH-LOK Company

*...or get your copy from your near-by Punch-Lok Distributor.



Punch-Lok Company
Dept. I, 321 North Justine Street
Chicago 7, Illinois

send me Clampways ideas FREE

Firm Name _____

My Name _____ Title _____

Address _____

City _____ State _____

4800

MINING OPERATORS USE McCarthy Drills

Heavy Rugged Powerful

AT Bessemer Limestone & Cement Co., Bessemer, Pa., one McCarthy unit (above) averages 90 ft. per hour, drilling through hard blue shale and sand rock 34 ft. deep. Blast holes are drilled on 18-ft. centers. Two men handle the whole job, including setup and moving. McCarthy drills operate with gasoline, diesel or electric power units . . . on all types of mounts. McCarthy "money-savers" can work for you. See your nearby distributor or write Salem Tool direct for further information.

SALEM
THE SALEM TOOL CO.
801 S. ELLSWORTH AVE.
SALEM, OHIO · U. S. A.

Brazil *(Continued)*

nese ore with "Companhia Meridional de Mineracao," a Brazilian corporation in which United States Steel Co. has a 49% interest.

It reportedly will take another 18 months or two years before preliminary operations for working of the mines can be started.

JAMAICA

Bauxite deposits are reported to have been found by a survey team five miles from the Good Hope ranch in Trelawny Parish. Samples of ore from the area are said to have shown, on analysis, that bauxite is present in the area in quantities at least equal to those of deposits at present being worked in the territory.

IN ASIA

PAKISTAN

Four more Canadian experts have arrived in Karachi to join the original team of nine geologists, who have been responsible for the photographic survey of northwest Pakistan.

The survey of Pakistan's resources—165,000 sq ft—at a cost of $2-million is claimed to be the largest ever conducted in that country. Under the Colombo Plan, Canada has set up a $10-million fund for this purpose. Survey reportedly has proven a deposit of 7-millions tons of iron ore in Chitral.

Since 1948, when the Government started moving towards development, production of minerals has increased substantially as shown by the following figures:

In Tons	1952	1953
Chromite	9,868	11,129
Limestone	333,199	411,847
Gypsum	13,753	12,469
Fire-Clay	3,069	4,159
Silica sand	3,478	3,128

RUSSIA

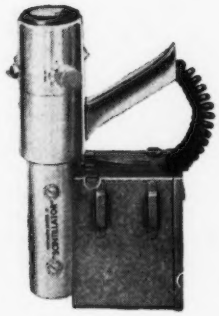
Small-scale Russian metallurgical establishments in the Urals Mountain industrial area have been sharply criticized for failure to operate efficiently.

The Communist Party newspaper *Pravda* asserted that dozens of small open-hearth and electric furnaces, Bessemer converters, cupola furnaces and rolling mills are failing to produce the assigned quotas of metal for machine tools, instruments, motors and machinery.

The low-grade politicians in the Kremlin apparently are cracking the whip over the mining and kindred industries. Only recently, *Pravda* attacks were directed against the Urals' copper industry (see *E&MJ*, February 1954, p 200).

In its latest attack, *Pravda* cited these

SCINTILLATION COUNTERS
FIND URANIUM 100 TIMES EASIER



Model 111 (pictured above) . . $495.00
Famous Halross Model 939 . . . 975.00
Airborne Optimum Model SAB-7 . 2810.00

• • • • •

ALL TYPES GEIGER COUNTERS
ULTRA VIOLET LIGHTS
SPECIAL LONG PROBE SCINTILLATION AND GEIGER COUNTERS FOR DRILL HOLES

• • • • •

CARPCO HIGH TENSION AND MAGNETIC SEPARATORS

• • • • •

ENGINEERS SYNDICATE, LTD.
5011 Hollywood Boulevard
Hollywood 27, California

HAVE YOU MOVED?

If you have changed your address . . . let us know so you will receive your copies of ENGINEERING AND MINING JOURNAL without delay.

Please change the address of my ENGINEERING AND MINING JOURNAL subscription.

.....
(Name)

.....
(Old Address)

.....
(City) (State)

.....
(New Address)

.....
(City) (Zone) (State)

.....
(New Company Connection)

.....
(New Title or Position)

MAIL TO:
ENGINEERING AND MINING JOURNAL
Subscription Service
330 West 42nd Street
New York 36, N. Y.

New . . . New . . . New . . . New . . .

How to Move MORE with a MICHIGAN* in 3/4 yard bites!

Clark Equipment Company presents the MICHIGAN Series "24"

Model T-24 Truck, 6x4 and 6x6; Model C-24 Crawler Shovel, Clamshell, Crane, Dragline, Hoe

14 Reasons Why—the MICHIGAN Series "24" Is Your Best Buy in '54

Full Vision Cab—new, stylized; all-around and overhead vision—3604 sq. in. glass; comfortable, quiet

Air Controls—clutches actuated by famous MICHIGAN* Air Controls

Power Clutches—single plate, double-disc, multiple-segment—air operated

Primary Drive—power transmitted through two sets spiral bevel gears running in oil

Shafts and Drums—hoist and crowd drums ball bearing-mounted on splined alloy steel anti-friction bearing-mounted shafts

Swing Brake—air operated; standard equipment

Circle Gear Casting—large diameter double-flange one-piece steel casting

Hook Rollers—six 7½" diameter, tapered, adjustable; ball-bearing mounted

Cast Turntable — machinery deck with boom hinge pin bracket and hook roller brackets—single steel casting

Big Brakes—powerful hoist and crowd brakes, 30" diameter

Worm Gear Boom Hoist—independent high speed hoist with automatic safety brake—standard

Removable Counterweight power-handled for easy, quick removal or assembly

Truck Chassis—heavy duty: big engine, transmission, axles; deep section alloy steel frame, cross-braced, welded; rear and center outriggers standard

Crawler Base—one-piece cast steel carbody and circle gear; spring loaded safety brakes; 24" tracks standard

You'll find the MICHIGAN Fact-Folio handy and helpful; contains full specifications, an interesting book "Get More Yardage Through Air Power," and numerous action photos. The coupon will bring yours promptly.

*Trademark of Clark Equipment Company

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
436 Second Street, Benton Harbor, Michigan

Please send the MICHIGAN "24" Fact-Folio

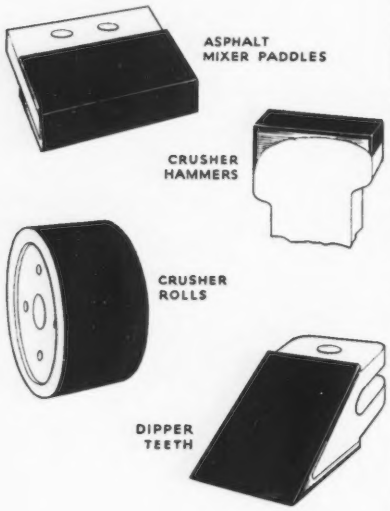
Name_____ Title_____

Firm_____

Address_____

City_____ Zone_____ State_____

BUILD UP WORN PARTS WITH REXARC S-3; HARD-FACE WITH 55



Build up with Rexarc S-3 and hard-face with "55" is a hard and fast rule with experienced weldors who know their "hard rod."

Why this popularity? The superior qualities of "S-3" are well known. Weldors acclaim Rexarc 55 for its extreme ease of application in any position, AC or DC. They like the smooth laydown . . . the tough, hard deposit that registers 54-60 Rockwell "C" in one pass!

Yes, where there's extreme impact and severe abrasion, specify Rexarc S-3 and 55 for best results. If you haven't tried this successful combination, call your Distributor, today, or write:

REXARC
HARD FACING AND MANGANESE ELECTRODES

THE SIGHT FEED GENERATOR COMPANY
60 EAST THIRD STREET
WEST ALEXANDRIA, OHIO, U. S. A.

Russia *(Continued)*

examples as prime targets:

"Rolling mills at the Lenin Machine-Building Plant in Zlatoust are not operating at capacity. Mill No. 600 operates only two shifts per day and is idle the third. Further, one day per week is planned as a day off, and down time was 10% during the first nine months of 1953. Down time is even higher at other Lenin Plant mills in Zlatoust—almost 20% for Mill No. 350 and 17% for Mill No. 270.

"Roofing iron is in great nationwide demand. But the sheet rolling mill at the Lenin Machine-Building Plant in Zlatoust, which could increase the output of this iron, is used only a few days in the year to meet the plant's own requirements.

"Two of the eight electric furnaces in the casting shop of the Chelyabinsk Tractor Plant are considered sealed off because of power restrictions and are used only when the other furnaces are shut down for repairs. It has been estimated that if the down time on the furnaces now operating were eliminated and if the two sealed furnaces were put in full operation, several tens of thousands of tons of high quality metal could be produced above the annual plan. Since the tractor plant is not fully using its capacities, it must obtain the metal it needs for production from steel mills in Magnitogorsk or Zlatoust.

"There are also large unused capacities at the open-hearth shop of the Chelyabinsk Transport Machinery Plant, the Ust-Katav Freight Car Plant, the Kolyushchenko Plant in Chelyabinsk and at other machine-building enterprises in the Southern Urals."

CHINA

Mutual Trust Co. of Hong Kong has come to terms with the Nittetsu Iron Mining Co. of Japan on the development of the iron ore resources of Ma On Shan in the Crown Colony.

Contract provides for the Japanese firm to lease to Mutual Trust equipment valued at 90-million yen (about $500,000) for completion of an ore dressing plant by next August. Nittetsu engineers are to provide technical knowhow and assistance.

The Yawata Iron & Steel Manufacturing Co. has agreed to take 120,000 tons of the ore annually. The ore, which averages 48% Fe, will be beneficiated to 60%.

IN AUSTRALIA

Australia is in the midst of a veritable uranium boom with several new uranium-prospecting projects under way and a constant flow of more or less reliable reports about new discoveries of uranium ore in various parts of Australia.

A considerable number of new com-

(Continued on p 185)

WEIGH WITHOUT STOPPING
WHILE YOU CONVEY

Yes, weigh and record with the —MERRICK

WEIGHTOMETER

The Merrick Weightometer provides a continuous, automatic, accurate weight record at any designated point in the mill, while material is in motion on conveyor. It weighs without interrupting conveyor service. Applicable to any size belt conveyor, horizontal or inclined. An accurate and dependable means of keeping constant check on production.

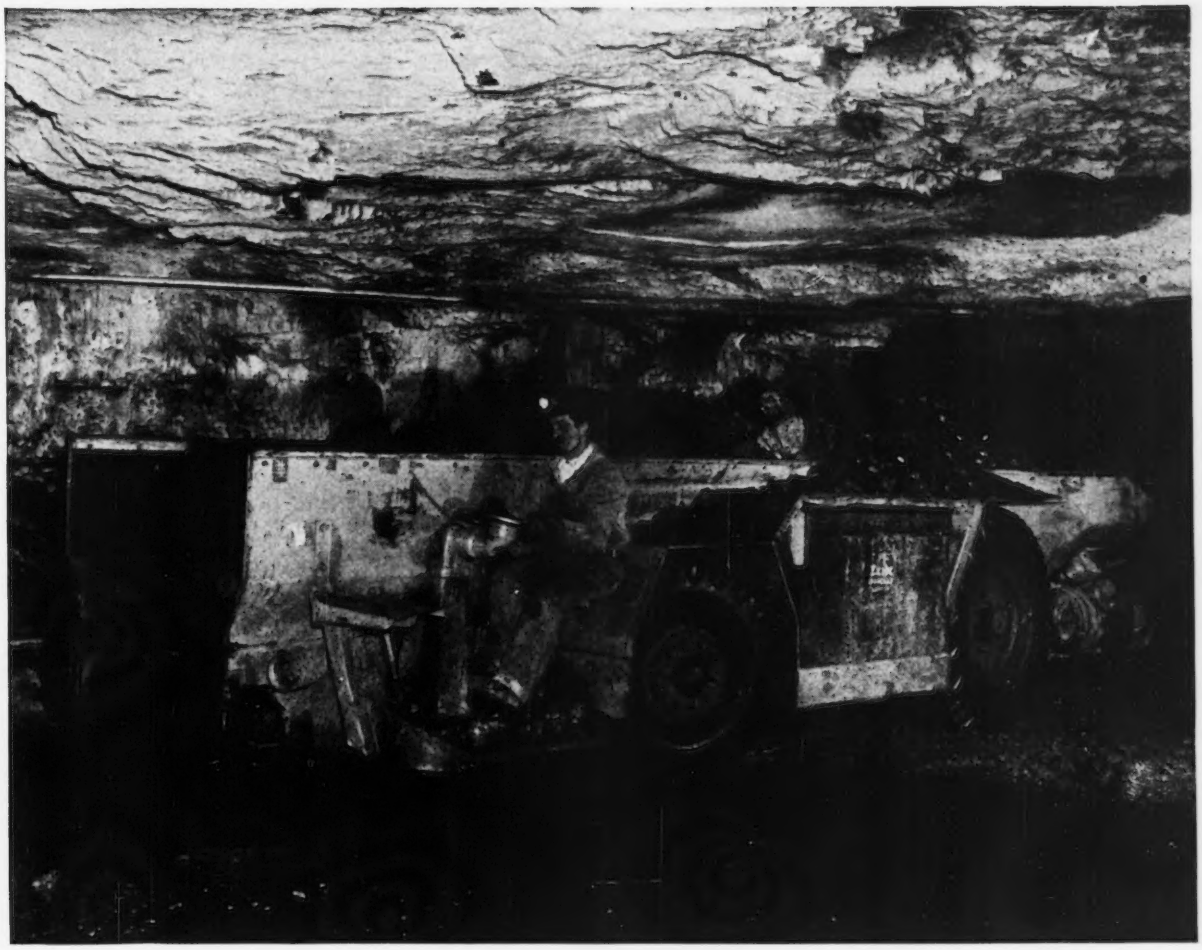
MERRICK SCALE MFG. CO. PASSAIC N. J.

PQ® Silicates are efficient in recovering complex ores of low concentration values. In one fluorspar operation recovery was above 95% using 1.2 lbs. of N® Silicate (ratio 1:3.22, 41° Baume).

May we discuss the use of a PQ® Silicate in your beneficiation system?

PHILADELPHIA QUARTZ COMPANY
1135 Public Ledger Building
Philadelphia 6, Pa.

PQ® Silicates of Soda
METSO® DETERGENTS



THE IMPROVED

Exide-Ironclad BATTERY

YOUR BEST POWER BUY *AT ANY PRICE*

Because it assures you rapid, high production haulage, more trips per shift . . . high maintained voltage, with uniform speed to end of shift . . . high availability . . . low operating costs . . . low maintenance costs . . . low depreciation costs . . . safety from hazards of fire and fumes.

Some of the many outstanding features

The long-life grids now contain corrosion-resistant SILVIUM. New polyethylene insulating bar seals bottom of tubes and retains active material—thus maintaining high battery capacity for a longer working life. Improved negative plates. New sealing compound. Seamless shock-proof jar. New unbreakable plastic vent plugs.

Types, sizes and capacities for battery-electric mine haulage units of every make.

"EXIDE-IRONCLAD" and "SILVIUM" *Reg. T.M. U. S. Pat. Off.*

Exide INDUSTRIAL DIVISION

The Electric Storage Battery Company, Philadelphia 2

Exide Batteries of Canada, Limited, Toronto

ENGINEERING AND MINING JOURNAL PRESENTS IN MAY

The E & MJ

In recognition of the tremendous importance of open cut mining in the world-wide metal and nonmetallic mining industry, the editors of ENGINEERING AND MINING JOURNAL are preparing a special section for the May issue which will tell

- **How efficient open pit operations are planned**
- **The most effective methods of operating an open pit**
- **What to consider in selecting equipment and supplies**

A convenient buyers' guide which will list the equipment and materials generally used in open pit mining . . . and the names and addresses of the companies who supply them.

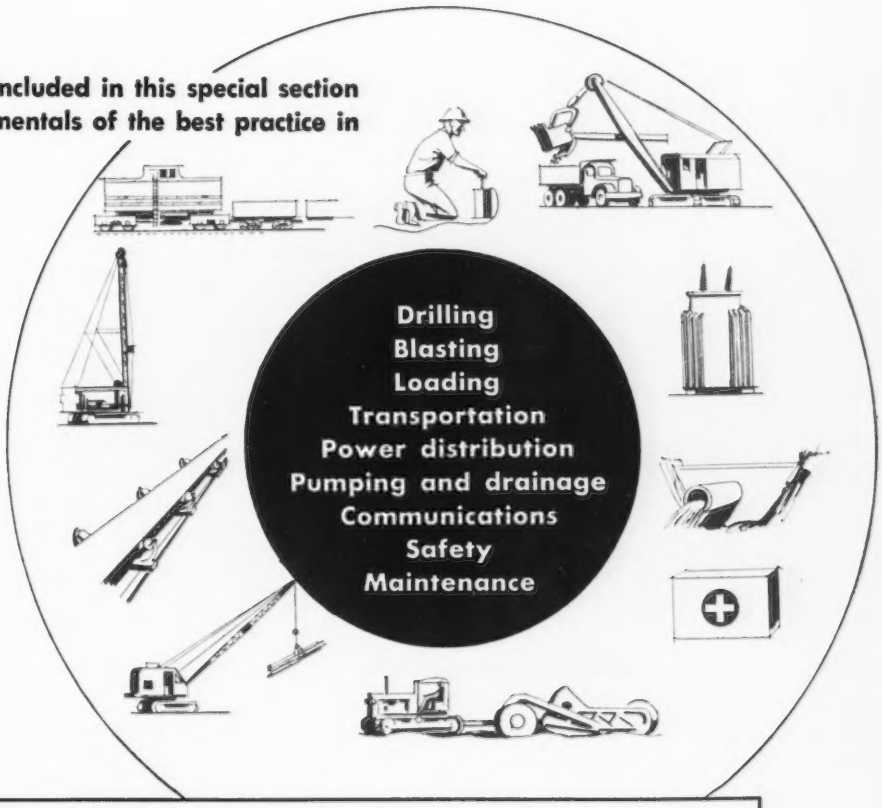
Advertisements showing and telling how specific equipment and supplies can help increase production at open pits or lower costs.

OPEN PIT MINES . . .

Produce 78% of the nation's iron ore.
Produce 80% of the country's copper ore.
Move more than 800,000,000 tons of ore and overburden annually.

Open Pit Mining Guidebook

Included in this special section will be the fundamentals of the best practice in



Important: The May issue of ENGINEERING AND MINING JOURNAL will contain all of the editorial departments and features which appear in every issue of ENGINEERING AND MINING JOURNAL.

Don't Miss the May Issue

A McGRAW-HILL PUBLICATION
330 WEST 42ND STREET, NEW YORK 36, N. Y.

ABP ABC

ENGINEERING AND MINING JOURNAL

CHECK 'EM OFF

THE INSIDE REASONS FOR MACK'S STAND-OUT $$$ EARNING POWER

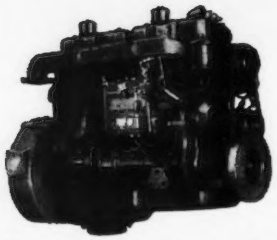
Keeping going under conditions that stop other trucks cold—carrying big payloads . . . on fast schedules . . . in the roughest operations—that's what points up the ability of Mack trucks to build greater profits for you.

WHEREVER YOU SEE A TOUGH JOB . . .
THERE IS WHERE YOU SEE MACKS

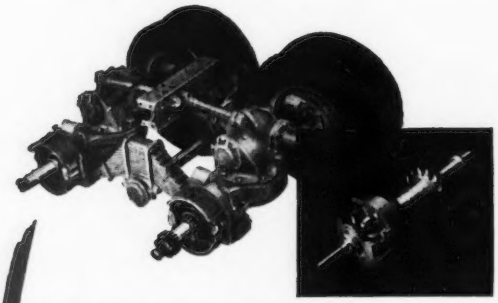
Mack TRUCKS

Mack Trucks, Empire State Building, New York 1, N.Y. Factory Branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

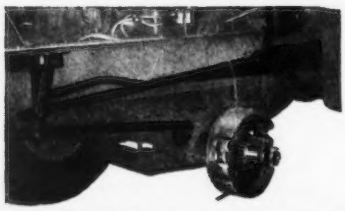
2277



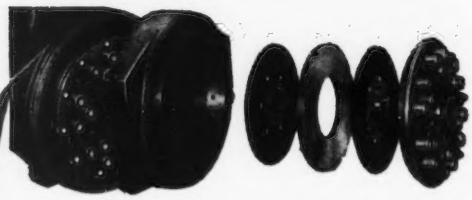
Plentiful Horsepower. Mack provides the right powerplant, gasoline or diesel, to haul most efficiently, most profitably for each specific operation. Complete range of engine options up to 400 horsepower. Coupled with the most rugged transmission or torque converters yet developed.



Balanced Bogie With Power-Divider. Only Mack six-wheelers offer the unique advantage of Mack's Balanced Bogie, incorporating the exclusive Power-Divider. With the Mack Power-Divider torque is distributed between bogie axles in proportion to traction, thus enabling Macks to pull through where other trucks mire in.



Power-Steering. Hydraulic power-steering permits effortless, fast steering and positive, shockless control.



Air-Assist Clutch. Operation of the big, double-plate clutch is virtually effortless, reduces driver fatigue.

Hydraulic Turbo-Braking Systems and powerful air-actuated brakes provide utmost safety for downhill going, assure safe and positive driver control at all times.

Australia *(Continued)*

panies is now searching or preparing to search for uranium and stock in these companies is daily increasing in value on the principal stock exchanges of Australia. So far, the interest shown in this search by foreign companies is very limited but it is known that a number of overseas concerns are following developments carefully and may enter the stage if and when something of real interest is discovered.

With three or four notable exceptions, the search for uranium is conducted in a rather primitive way although considerable help is available from the Bureau of Mineral Resources. It is generally believed that after the general elections (probably May/June 1954) the Government then in power will re-examine the position and establish a working national policy towards the quest for uranium and its disposal.

At present the Australian Atomic Energy Commission is buying uranium from all sources paying as little as £10 per ton of ore with 0.25% grade oxide and a maximum of £504 for one ton grade 10.0%. Grading is based on the percentage of uranium oxide by weight in the ore. The minimum standard grade is 0.25% of uranium oxide and the minimum parcel the Commission will buy is 10 tons of 1% ore or its equivalent.

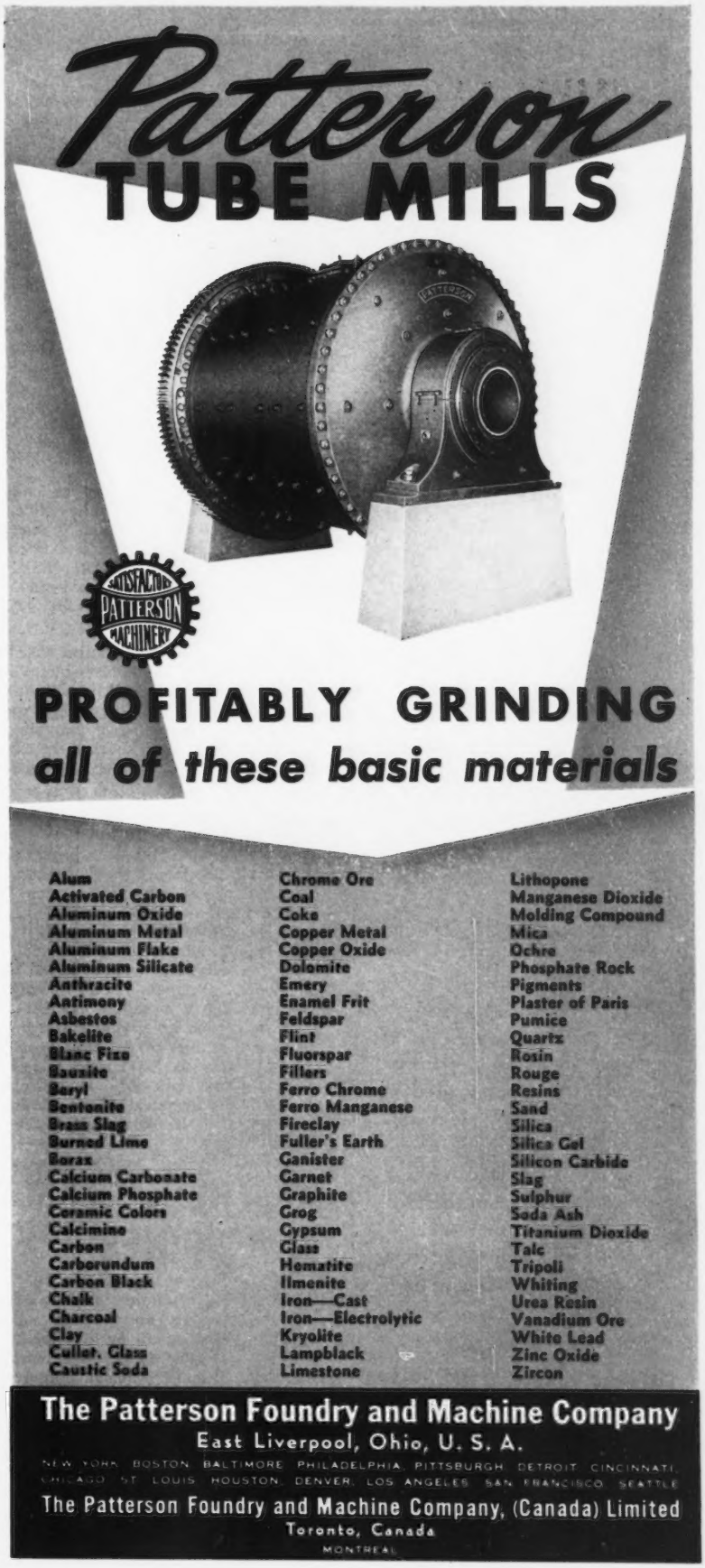
Several new reports of interesting discoveries were recently received. Favorable outlook is reported by search parties in the mica fields in the Harts Range in the Northern Territory but the reports from Western Australia are still deficient in authoritative details about the alleged discoveries of uranium ore.

It seems now that the uranium find on Dundas goldfields in Western Australia is really composed of two distinct finds. The first is an extensive area of brecciated granite in which two trenches 40 ft apart have discovered uranium. There are indications that this mineralization extends over an area of some size and trenching and other exploratory activities will be continued. The second and a less definite prospect is on Dundas Lake.

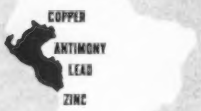
Peko Gold Mines N.L. is expected to concentrate on copper as a result of its recent work on the 300-ft level. The deepening of the winze below this level has indicated greater values of copper and the orebody on this level has been now proved for a distance of 310 ft and and average width of 43 ft.

Initial operations at Peko will consist of extraction of the copper orebody beginning from the 400-ft level and the treatment of this ore by flotation for the recovery of high grade concentrates. Cathode copper will be produced by FluoSolids roasting method.

Several Australian tungsten companies are restricting operations or closing altogether as a result of the fall in prices of tungsten. This, however, does not apply to the principal two producers who have long-term foreign contracts at minimum prices considerably above market prices.



WHETHER IT'S ORES FROM PERU



OR OILS FROM PARAGUAY

TENNANT

WORLD TRADERS SINCE 1825

BRINGS IT TO MARKET

Tennant is a company of traders in a wide range of raw materials. From South America, Tennant also imports beryl, iron, manganese, tin and tungsten ores vitally needed for U.S.A. industry. And in return, Tennant sends raw materials, chemicals, metals and metal products, mining and industrial machinery required in the progressive development of South American countries. The Tennant heritage is a tradition of *service* to producers and consumers.

C. TENNANT, SONS & CO.,
OF NEW YORK
100 Park Avenue, New York
244 California Street, San Francisco
Offices in Lima, Rio de Janeiro, São Paulo
Cables: "TENNANTS" at all offices

Australia *(Continued)*

Tungsten Consolidated Ltd. is the latest to announce a cut in output. This company finds that it cannot operate profitably at prices below £A13 a unit for wolfram.

A similar situation is noted in respect of some small producers of rutile and other beach sand minerals. Titanium Minerals Ltd. which suspended rutile operations has high hopes for extracting tin oxide and is cooperating actively with Austral Malay Tin Ltd.

Al Consolidated Gold N.L. is sinking a shaft below 1900 ft. at its Gaffneys Creek mine. Latest estimate of ore reserves is 15,000 tons of 10 dwt grade and an improvement in this company's outlook is expected as a result of treatment of larger tonnage of ore and availability of cheap power.

Water shortage has limited the amount of ore crushed by Centralia Minerals Ltd. which has the potential of one of the biggest reef tin mines in Australia. Driving and sinking on the Stannum King tin shoots is being continued and an expansion of exploratory activities is being planned.

Northern Mines Development N.L. has taken an option on the Hercules Gold Mine near Pine Creek in the Northern Territory and has decided to begin prospecting for uranium. Uranium will be expected to crop up in some of the leases in the close vicinity of Rum Jungle uranium fields.

Pure uranium oxide has been refined for the first time in Australia, at a pilot plant at Radium Hill, South Australia. The oxide represents the last stage in the treatment of crude uranium ore before smelting into uranium metal.

In September 1953 the Australian Government announced that the U.S. Atomic Energy Commission was to ship a complete uranium-refining plant to Australia, and it is understood that this plant is now on its way to the country.

Small quantities of uranium ore were sent last year to the United States to determine the type of refining plant necessary for treatment of the ore from Rum Jungle, in the Northern Territory.

IN THE PHILIPPINES

Philippine gold mining interests assert that their industry may collapse unless something is done to improve the current price of gold in the free market. Henry A. Brimo, president, Philippine Gold Producers Association, has stated that the outlook for 1954 is so serious that only one or two gold mines may survive unless the Government, under President Magsaysay, provides direct aid.

Brimo pointed out that three gold mines closed last year, despite the Government's tax relief program. He said that the higher minimum wage and the

Kleenslot
SCREEN GUARDS

The screen guard is built into the screen and the guard bars permit only the finer particles to pass over the screen. All sizes and most materials furnished.

HERE'S HOW IT'S DONE

Cross section at left shows how KLEENSLOT Screens operate on a non-clogging principle.

Wedge Wire KLEENSLOT screen guards can be furnished in special sizes to your requirements in practically any type of long wearing metal. They are made to close tolerances like all Wedge Wire products—the width of each wire is held to plus or minus .002 to insure uniform opening width. All Wedge Wire features are embodied in these screen guards and it is to your advantage to consider them from the standpoint that they are non-clogging, non-blinding, strong, rigid uniform and more economical in the long run.

SEND FOR OUR ILLUSTRATED LITERATURE

Wedge-Wire
CORPORATION
GAS ST. AT NICKEL PLATE R.R.
WELLINGTON, OHIO

Diamond
Core
Drilling

Mineral Exploration

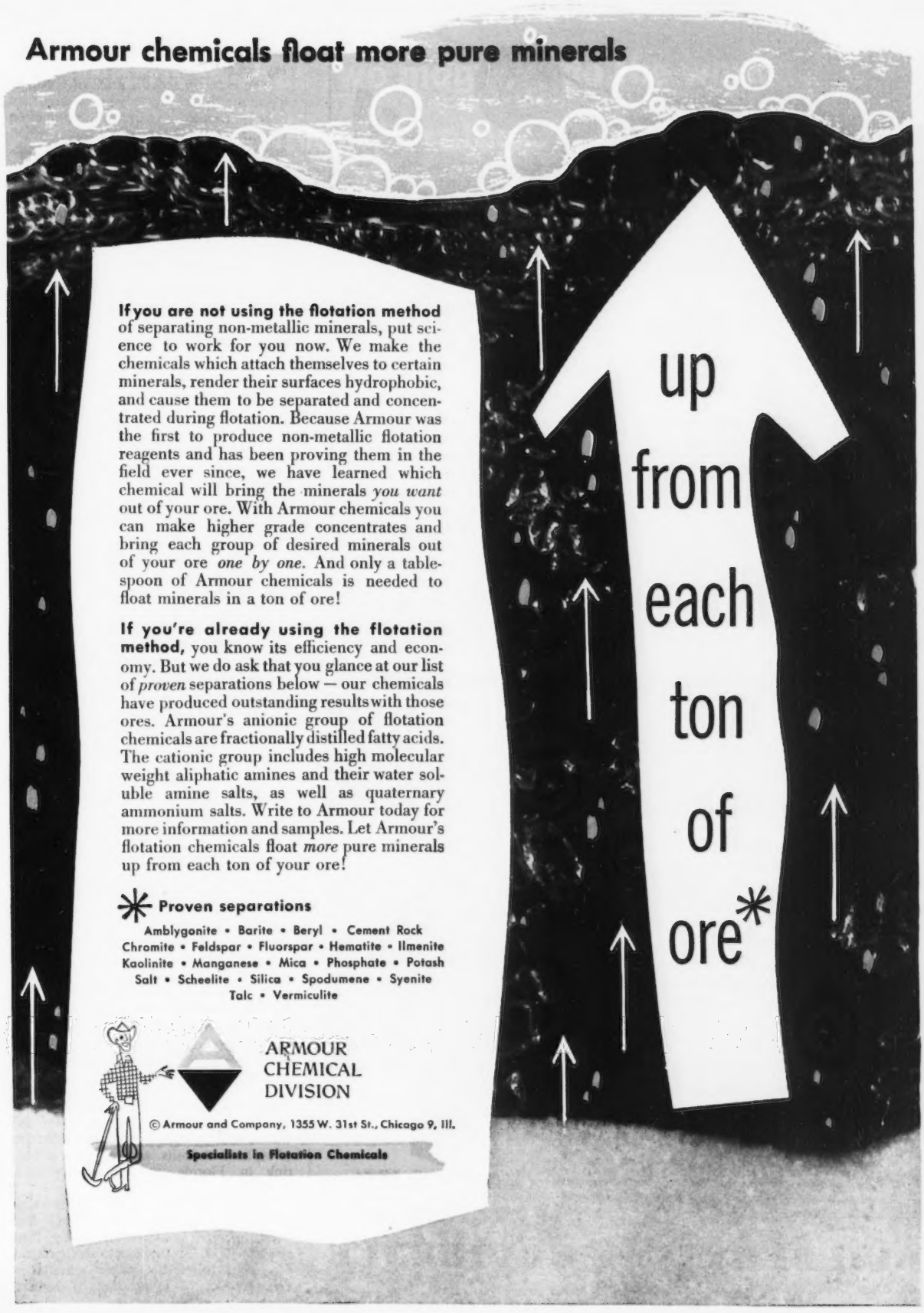
Foundation-Test
Drilling

Grouting

More than 15 years experience
with trained crews.
Estimates on request.

Tinney Drilling Company
113 W. Main St.
Grafton, W. Va.
Phone 130

Armour chemicals float more pure minerals



If you are not using the flotation method of separating non-metallic minerals, put science to work for you now. We make the chemicals which attach themselves to certain minerals, render their surfaces hydrophobic, and cause them to be separated and concentrated during flotation. Because Armour was the first to produce non-metallic flotation reagents and has been proving them in the field ever since, we have learned which chemical will bring the minerals *you want* out of your ore. With Armour chemicals you can make higher grade concentrates and bring each group of desired minerals out of your ore *one by one*. And only a tablespoon of Armour chemicals is needed to float minerals in a ton of ore!

If you're already using the flotation method, you know its efficiency and economy. But we do ask that you glance at our list of *proven* separations below — our chemicals have produced outstanding results with those ores. Armour's anionic group of flotation chemicals are fractionally distilled fatty acids. The cationic group includes high molecular weight aliphatic amines and their water soluble amine salts, as well as quaternary ammonium salts. Write to Armour today for more information and samples. Let Armour's flotation chemicals float *more* pure minerals up from each ton of your ore!

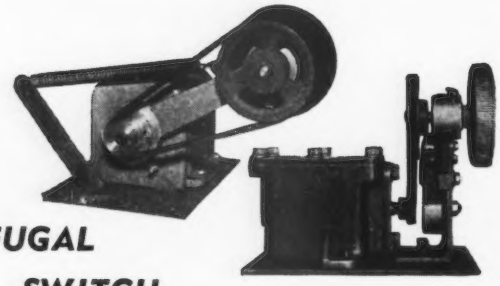
*** Proven separations**

Amblygonite • Barite • Beryl • Cement Rock
Chromite • Feldspar • Fluorspar • Hematite • Ilmenite
Kaolinite • Manganese • Mica • Phosphate • Potash
Salt • Scheelite • Silica • Spodumene • Syenite
Talc • Vermiculite

ARMOUR
CHEMICAL
DIVISION

© Armour and Company, 1355 W. 31st St., Chicago 9, Ill.

Specialists in Flotation Chemicals



ENSIGN
CENTRIFUGAL
SWITCH

immediate power cut-off protects conveyor belts . . .

Ensign Centrifugal Switches with time delay relay, protect belts against fire due to slippage, reduces belt replacements, shut-downs, tonnage loss. Easily added to existing systems. Provides sequence operation in multiple belt or chain units. Operates forward or reverse. Dust-tight or explosion-tested enclosures.

Request Ensign Bulletin 1100 (dust-tight) or 1101 (explosion-tested).

ENSIGN ELECTRIC & MANUFACTURING CO.
914 Adams Avenue, Huntington 4, W. Va.

WEIGH IT ON THE GO!

Builders Conveyoflo—the modern conveyor meter — totalizes the weight of dry material passing over conveyor belts. Continuous, automatic, extremely accurate — Conveyoflo is installed right in your present conveyor, or can be furnished as a separate, self-powered conveyor and scale unit. Capacity is limited only by the capacity of the conveyor belt itself.

EXCLUSIVE FEATURES

- Accurate . . . within ± ½ of 1% of actual weight from maximum to 50% of meter's rated capacity; within 1% from 50% to 25% rate; within 2% from 25% to 10% of rated capacity.
- Automatic totalizer compensation for variations in belt speed and changes in belt weight.
- Responds accurately to rapid load variations.
- Paces auxiliary equipment (feeders, controllers, continuous blending processes, etc.) and operates secondary instruments.

Write for Bulletin 550-H4. Builders-Providence, Inc. (Division of B-I-F Industries, Inc.), 391 Harris Avenue, Providence 1, Rhode Island.

BUILDERS PROVIDENCE

PIONEERS IN METERS AND CONTROLS

Philippines *(Continued)*

lower price of gold outweighed the tax relief.

The industry seeks a price of gold and a long-term guarantee high enough not only to keep existing mines in production but also to encourage those mines which are now developed but standing by waiting for better days to begin operations.

To these ends it urges a direct subsidy, allied to a "gold certificate" plan. Under such a plan, which has been widely discussed during the past year, a premium price for gold would be linked to premium prices for imports of consumer goods.

IN EUROPE

GERMANY

Famous Bochum Mining Museum, damaged during World War II, has been fully restored and will be expanded. The museum, located in an underground mine accessible to visitors, contains 40 sections. It provides an overall survey of all branches of mining.

FRANCE

Usually well-informed sources in Paris say that the Ministry of Finance has reached agreement with the Greek Government for France to aid in construction of a hydroelectric power project on the Mekova River and in development of Greek mineral resources, particularly the rich deposits of lignite in northern Salonika.

Texas Firm Producing By-Product Uranium

TEXAS CITY CHEMICALS, INC., is now operating a production unit to recover uranium concentrate as a by-product in its new phosphate products plant at Texas City, Tex.

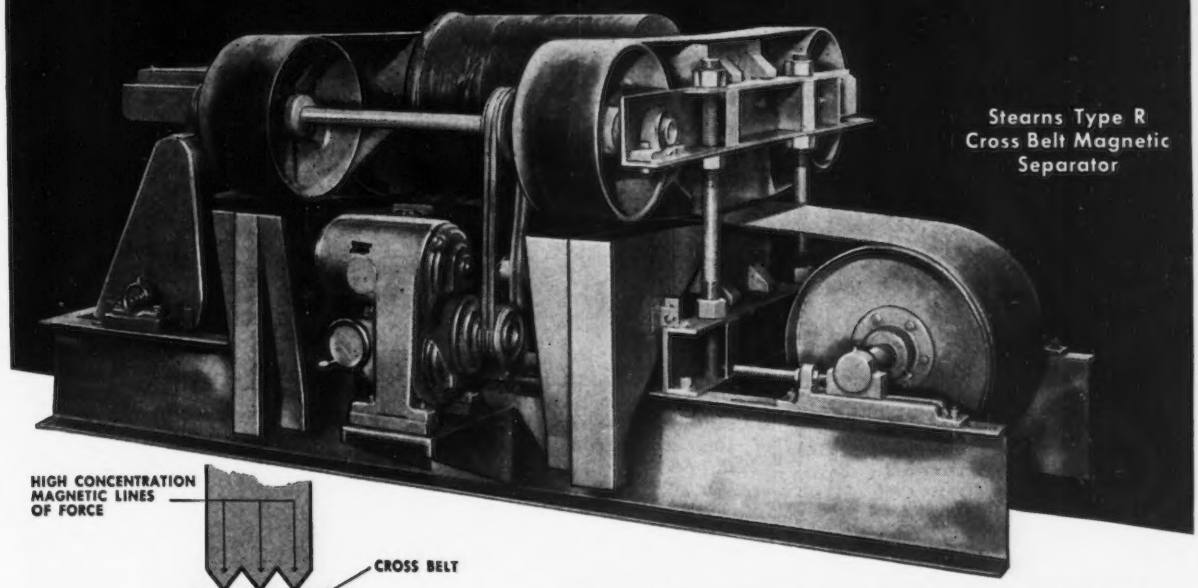
Unit was designed to recover uranium concentrates as a by-product of feed grade dicalcium phosphate and fertilizer grade dicalcium phosphate derived from Florida phosphate rock containing minor quantities of uranium.

The Texas firm has a contract to supply uranium concentrate to the Atomic Energy Commission.

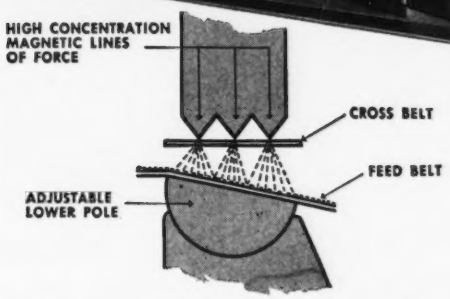
The Commission has been sponsoring research and process development studies for the recovery of uranium from domestic sources such as the very extensive phosphate deposits and reserves occurring in Florida and several western states.

The first commercial unit for recovery of uranium from phosphate rock has been operated continuously since September 1952, by the Blockson Chemical Co., near Joliet, Ill., where uranium is recovered as a by-product of sodium phosphate chemicals.

Stearns makes two magnets do the work of five in strategic ore separation



Stearns Type R
Cross Belt Magnetic
Separator



Exclusive variable pitch lower pole. Simply by varying the pitch of the lower pole piece you can vary the air gap between the upper and lower poles to increase or decrease strength of magnetic lines of force at each point. This enables very selective extraction of distinct magnetic products at each point. The most magnetically responsive ore will be separated at the first or wide gap point. As the air gaps get smaller the magnetically weaker ores are extracted and carried off on the bottom side of the cross belt. Non-magnetic material is carried off on the feed belt.

With this variable pitch lower pole, as many as one non-magnetic and ten magnetic products can be obtained from just two magnets. *To do this same job on ordinary separators would require five magnets, take up much more floor space and cost approximately twice as much.*

Equipped with exclusive, patented variable pitch lower pole, the Stearns cross-belt magnetic separator does more work, faster and at lower cost than comparable units of greater size. It provides amazing control in separating weakly magnetic ores in both placer and hard rock deposits — monazite, wolframite, huebnerite, ferberite, columbite, tantalite and ilmenite. Other special features include:

1. Individual, independent variable speed drives for both cross belts and feed belt . . . an exclusive Stearns feature.
2. Separator is furnished with an electric control panel with rheostat and ammeter to adjust strength of magnet.
3. Design of unit permits closed magnetic circuit — magnetic intensity is utilized at exactly the desired points.
4. All points in each magnetic field are of the same polarity. This, plus the fact that the mineral grain is entering successive points of increasing magnetic intensity, because of the adjustable lower pole, helps to overcome magnetic reluctance in weakly responsive materials.

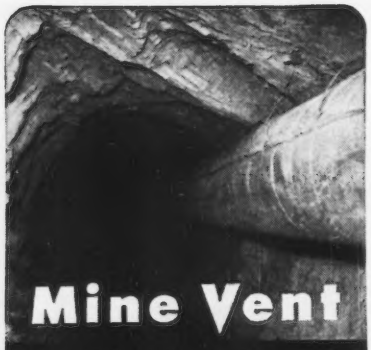
Stearns maintains a fully equipped laboratory for thoroughly analyzing and testing ore samples. This, plus Stearns' wide experience in the magnetic separation field, assures you of getting exactly the right unit for your needs. Ore samples for analysis or requests for information receive immediate attention. Write today.

1073

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

STEARNS MAGNETIC, INC. • 624 S. 28th ST. • MILWAUKEE 46, WIS.



Mine Vent

TUBING

makes plenty of fresh air at the working faces a Reality . . .

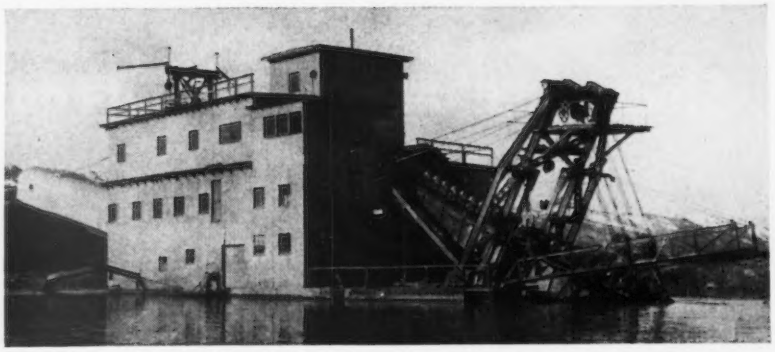
At a moderate cost, including installation, you can make your ventilation system *complete* with MINEVENT TUBING. The returns in greater output per man will repay the investment many times over.

MINEVENT TUBING delivers fresh air, without waste, to the men who need it. Installation or removal are dead easy with patented couplings and hangers. Standard accessories, shown below,—"Ts", "Ys", "Ls" and reducers—make MINEVENT TUBING adaptable to all conditions. Thus rugged tubing is fungi and leakproofed. It's flexible, withstands repeated handling, and cannot collapse during operation. Three grades: sizes 8" to 36".

ABC JUTE BRATTICE CLOTH is the durable material for sealing off inactive areas and directing fresh air to the men who are working. Properly treated to resist flame, fungi, shrinkage and leakage. Made in two grades.

Write for ABC samples and full information.

AMERICAN BRATTICE CLOTH CORP.
WARSAW, INDIANA



THE BAUMHOFF-MARSHALL INC., DREDGE, above, and the Idaho-Canadian Dredging Co. dredge are operating in Long Valley recovering black sand. The flat valley offers ideal dredging ground with few rocks larger than a man's fist.

Dredges Work Idaho Sand

DREDGING HAS BEEN GIVEN a new lease on life in Southern Idaho by the atomic age, and increasing numbers of the enormous floating dredges which once turned up mountain valleys for gold are now being converted to recover precious black sand containing monozite, uranium, columbium, tantalum, thorium and rare earth oxides.

Two companies, Baumhoff-Marshall Inc., and Warren Dredging Corp., began the first dredging operation of this type in Idaho three years ago with one dredge each. They also subleased part of their nearly 1500 acres in Long Valley near Cascade to the Idaho-Canadian Dredging Co., which also brought in one dredge. The Warren dredge was later demolished in an accident.

The Long Valley land contains about 15½ lb per cu yd of black sand, and the chief material recovered from the sand is the yellow monozite, (source of thorium used in atomic work) which makes up about 7½% of the sand.

After the dredges concentrate the black sand by gravity methods, it is trucked to Cascade and taken by train to the separation plant at Boise owned by Baumhoff-Marshall Inc. There the sand is given magnetic treatment to separate the various minerals from the sand.

The companies have found no market for the ilmenite, which makes up the black portion of the sand and which is made up of a generous portion of titanium needed in defense production. The companies have stockpiled 60,000 tons of the black mineral.

The monozite, containing about 60% rare earth metals, is contracted about one-half each to the Lindsay Light and Chemical Co., Chicago, where it is further broken down into the various metals, and to the government for stockpiling.

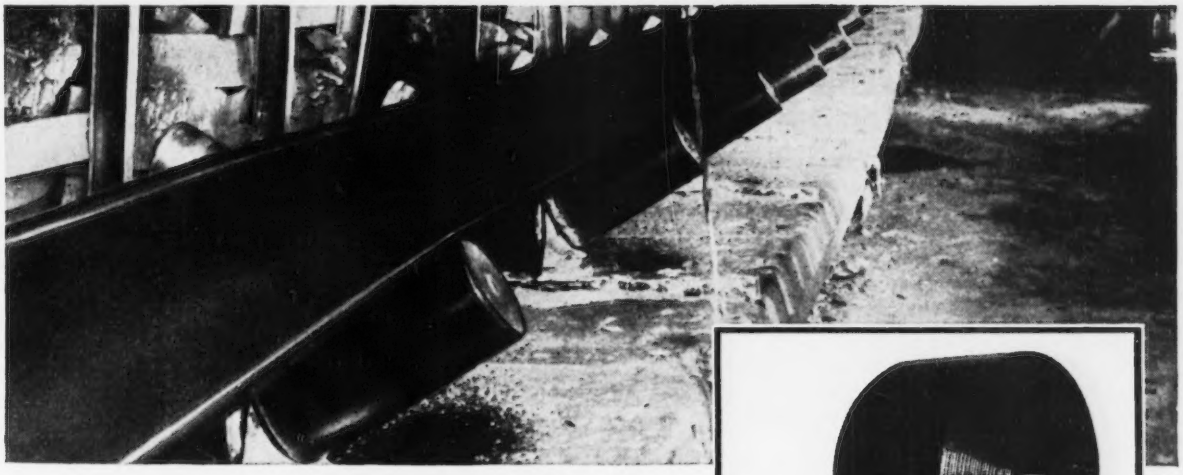
Recently Porter Brothers Corp., Boise, announced that it would develop a "new source" of uranium, columbium, tantalum, thorium and monozite in Bear Valley, 95 mi northwest of Boise.

BLACK SAND containing monozite, source of thorium, and ilmenite, one-fourth of which is titanium, is the product of two dredges working in Long Valley near Cascade, Idaho.

According to company officials, the proved ground would have a "life" of 28 years at the proposed production of two and one-half million yards a year. The entire project would extend over 80 yr if the land proves as good as indications now show.

Construction of dredges to work the 11,500 acres in Bear Valley was started late in the fall, and the company's land plant is expected to be in operation in Boise by September 1954.

"We feel we have the only property in the country that opens a new field for columbium, tantalum and radium," said corporation president Robert P. Porter. The find of the critically scarce materials needed for war production is expected to make the Porter property one of the nation's largest producers of these metals.



*Top photo shows Face Conveyor in British coal mine. Inset shows roll of SCANDURA.

NEW SCANDURA

the original P.V.C. coated

CONVEYOR BELTING

eliminates big FIRE HAZARD in mining operations

One of the great hazards of mining—fire caused by a belt stalled over a still-rotating driving drum—is eliminated by new SCANDURA BELTING .... the original P.V.C. Coated Conveyor belt which was developed in the United Kingdom and now manufactured by us in our Charlotte, N. C. plant.

LET'S LOOK AT THE RECORD!

About 12% of coal mining fires in the past several years have been attributed to conveyor-belt friction.

At the 1953 annual meeting of the Illinois Mining Institute, data was presented to show that the majority of belt fires result from stalled belts while the idler pulley continues pulling.

In the tragic Evanston, Ky. fire in which 4 men lost their lives, fire was reported to have had its origin in the friction caused when a fall stopped the belt, while the drive motor continued to operate.

This record clearly points to the great need for SCANDURA BELTING!

Other unique SCANDURA features:

- *Withstands abrasions that would ruin other belts.*
- *Exceptionally tenacious in holding fasteners.*
- *Solid woven base with covers that will not strip, gouge or "dog ear".*
- *Not affected by water, dilute acids, alkalis, salt solutions, etc.*
- *Non-inflammable, mildew and rot-proof.*
- *Works in temperatures ranging from 22° below to 212° above.*
- *Can be made in widths from 1" to 42" and thicknesses from 1/8" to 3/8".*

SCANDURA has been tested and used with gratifying results in Britain since 1946. For safety and economy, it's in a class by itself. Write, wire or telephone for complete data.

SCANDINAVIA BELTING COMPANY

250 CENTRAL AVENUE, NEWARK 1, N. J.

BOSTON • **PLANT: CHARLOTTE 1, N. C.** • CLEVELAND

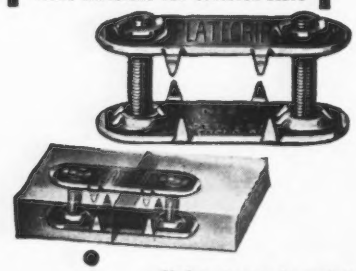
We're going to remodel our old conveyor... who do you recommend for parts?

Barber-Greene is your best bet for all conveyor components, carriers, belts, truss or channel sections, drives, back stops, feeders, etc.

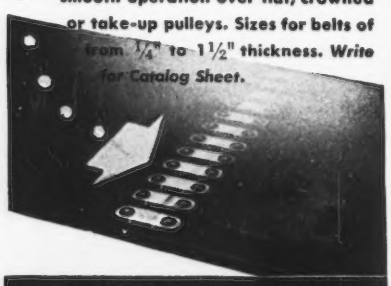
see your B-G distributor or write

Barber-Greene
AURORA, ILLINOIS, U. S. A

PLATEGRIP
PLATE FASTENERS FOR CONVEYOR BELTS



Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from 1/4" to 1 1/2" thickness. Write for Catalog Sheet.



ARMSTRONG BRAY & CO.
5322 Northwest Highway, CHICAGO 30, U. S. A.

Western Mining Conference *(Continued from p 120)*

zinc mining industry in the United States (for a full discussion of the Taft-Fletcher arguments, see p 78).

Ernest V. Gent, executive vice president, American Zinc Institute, commented that "It is exasperating and ironic that in time of peak consumption we cannot prosper."

Others who addressed the 57th annual Conference included:

Felix E. Wormser, Assistant Secretary of Interior for Minerals, who commented that ". . . I see no way of encouraging both foreign and domestic producers of lead and zinc without flooding an already saturated market."

Harry Sears, president, Calaveras Central Gold Mining Co., Angels Camp, Calif., who said that the United States must return to the gold standard to protect its currency and exchange system from collapse under world pressures.

Rep. W. Sterling Cole (R., N. Y.) who disclosed that the United States holds "incontestable supremacy" in the race with Russia for atomic and hydrogen bomb superiority.

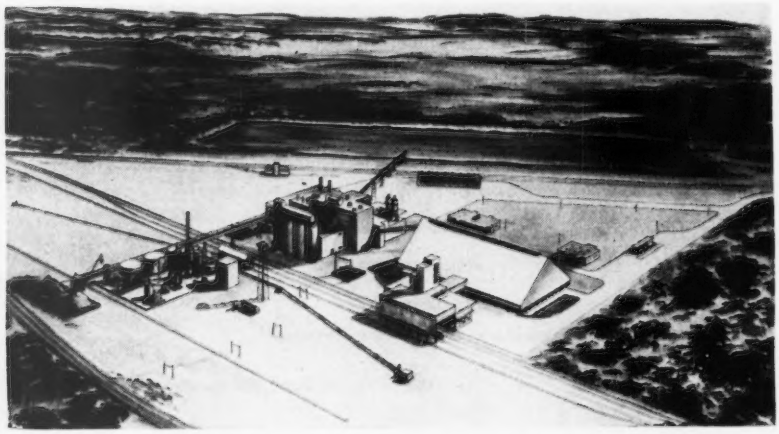
John J. Forbes, director, U. S. Bureau of Mines, who told delegates that "There can be no question as to the ultimate prospects of the mining industry for any part of the United States. The problem is how this insatiable demand is to be met."

Lashing "free trade" as a "fraud and a delusion," the Resolutions Committee went on record as favoring equalization of foreign and domestic ore production costs. In a sharply-worded report to delegates, the Committee called for enactment of legislation to protect the American workman's standard of living.

It deplored what it termed the use of the metal mining industry as "the nation's guinea pig upon which have been tested impractical and unworkable economic and political theories."

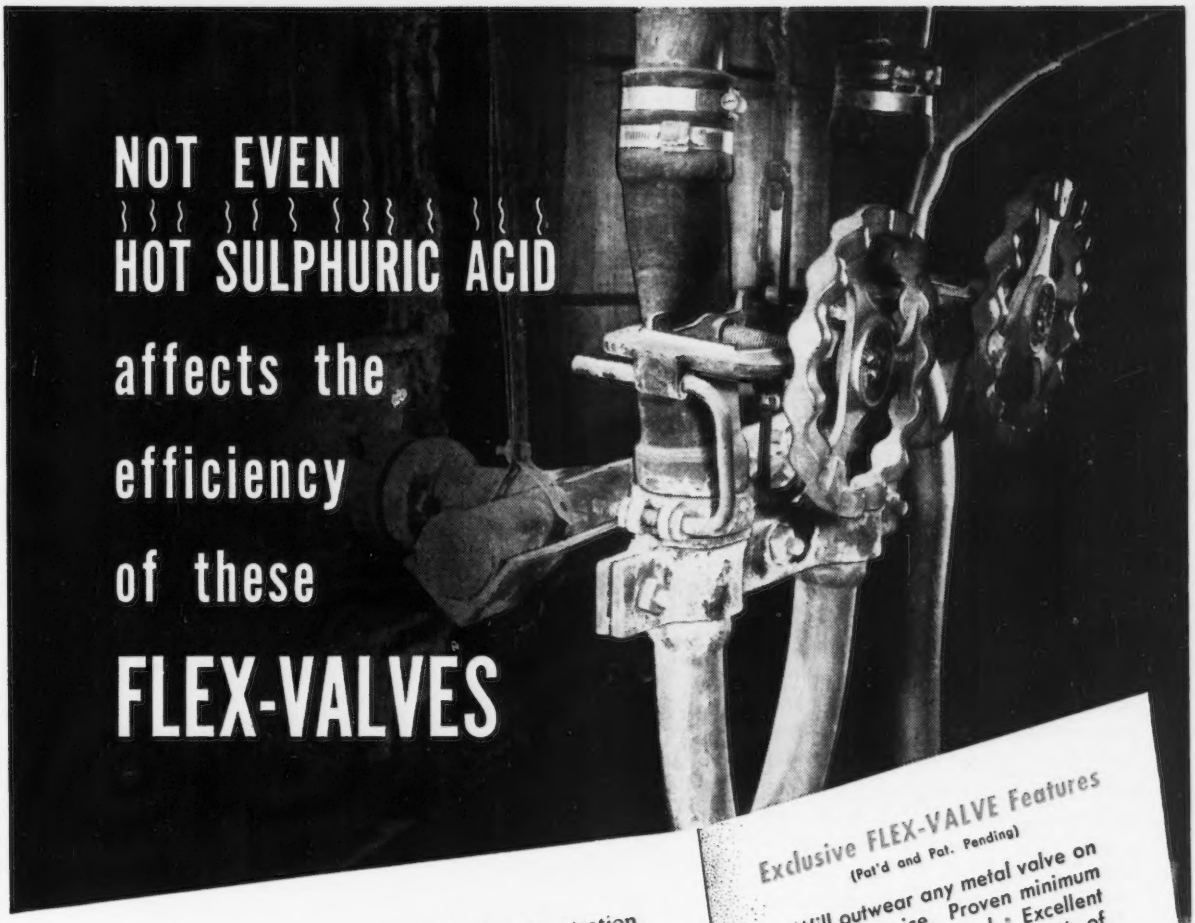
Included in a 9-point program were resolutions to:

- Oppose the principle of severance taxes "as being discriminatory in form and Socialistic in origin."
- Require foreign nations to adopt anti-trust, social security, compensation "and other laws" to protect the American workman's standard of living "before any attempt is made to establish so-called 'free trade' between those countries and the U.S."
- Adopt "a realistic schedule of import duties and taxes on all foreign metals and minerals . . . to equalize the cost of production of foreign and domestic ores."
- Abolish pacts prohibiting the unlimited coinage and free exchange and ownership of gold and silver coins and bullion.
- Request the Administration to appoint "more experienced and more practical-minded officials to our mineral policy-making boards."
- Extend the industry's opposition to "any material changes" in federal mining laws. "Metal mining must remain private enterprise," the report said.



New $12.5-Million Triple Superphosphate Plant

This architect's drawing depicts the new $12.5-million triple superphosphate plant of The Davison Chemical Corp., near Bartow, Fla. Completely designed and engineered by The Dorr Co.'s consulting engineering department, the plant capacity is 200,000 tons of triple superphosphate per year. Start-up is scheduled for early 1954 and marks Davison's entry into the concentrated fertilizer field. The plant uses the Dorrco Strong Phosphoric Acid Process to produce 32 to 33% P_2O_5 phosphoric acid with a single stage of filtration. A free-flowing 100% granular fertilizer is guaranteed with the Dorrco Fines Recirculation System.



NOT EVEN HOT SULPHURIC ACID affects the efficiency of these FLEX-VALVES

A solution of copper sulphate with a high concentration of sulphuric acid—at approximately 180° F—has failed to give these valves trouble in more than two years. At a leading smelting and refining company*, where precious metals are refined and copper sulphate is produced, FLEX-VALVES have once again proven the superiority of their simple construction and corrosion resistant characteristics. If you have a fluid that's "too hot to handle" for ordinary valves, specify trouble-free FLEX-VALVE. Write for catalog No. FL 382.

*name available on request.

Exclusive FLEX-VALVE Features
(Pat'd and Pat. Pending)

• Will outwear any metal valve on abrasive service. Proven minimum 11 to 1 life over metal • Excellent control characteristics in first 1/3 of travel • Tight on grits up to 1/8" • Valve body available in pure gum rubber, neoprene, butyl, buna-n, buna-s, food stock and special compounds • Full pipe capacity • Will not freeze up in outdoor service Complete closure for bubble-air tightness • No obstruction, pockets or internal parts.

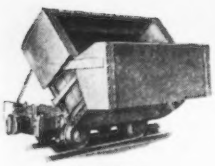
Your Money Back if it Plugs.

Representatives in Principal Cities

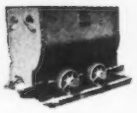
Farris FLEXIBLE VALVE CORP.

619 COMMERCIAL AVE., PALISADES PARK, N. J., U.S.A.

affiliates: FARRIS ENGINEERING CORP. • FARRIS STACON CORP. • FARRIS HYDROSEAL CORP. • FARRIS HYDROTORQUE CORP. • FARRIS PICKERING GOVERNOR CO.



Granby-type Dump Cars

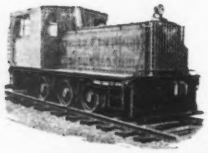


Mining Cars

Tray-type double Side Dump Cars

PROVED IN SERVICE

Cradle Dump Cars

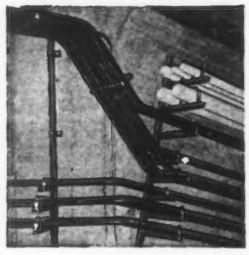


Diesel Mechanical, Diesel Hydraulic, Diesel Electric, Alcohol and Gasoline Locomotives from 3 to 70 tons

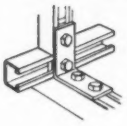
Join the mine operators and engineers who act on facts—and buy on results—men who are in the habit of doing business with Pressed Steel Car Company.

In mines all over the world . . . under conditions that demand the best from every piece of equipment . . . Pressed Steel Car products have proved their worth. That's because Pressed Steel Car equipment is designed to do the job faster . . . is engineered to do the job better . . . is built to last longer. Specify Pressed Steel Car equipment and watch costs go down—and efficiency go up.

We'll be glad to help you select the right equipment for your particular job. Just send particulars to our Research Department. Our engineers will be glad to give you the benefit of their experience without cost or obligation.
Just write—Department J



Unistrut metal framing can be used as a support for power cables, as shown, and for practically every rack and shelving installation. Unistrut requires no hole drilling, no welding—is 100% adjustable and is 100% re-usable.



Steelcar

Products to Serve Industry . . . Farm . . . and Home Hydraulic Pumping Units • Precision Deep Well Plunger Pumps • Steel Sucker Rods • Engine Lathes • Aircraft Landing Gear Shock Struts • Precision Gears & Gear Mechanisms • Dairy Cans & Equipment • Self-Closing Receptacles • Permanent Cookware • Farm Holding Tanks • Storage Hoppers • Alloy Steel Containers • Oil Storage Tanks • Rendering and Softening Tanks • Agitators • Smoke Stacks • Dust Collectors Coal and Ash Hoppers • Lock Nuts & Bushings • Couplings & Connectors Fittings & Electrical Accessories • Unishelter Homes

PRESSED STEEL CAR CO., INC.

EXPORT DIVISION

25 Broad Street
New York 4, N. Y.

Railway Freight Cars (Mainline) • Industrial Railway Cars for agriculture, mining, construction, factory and mill service • Permanent and portable Industrial Railway Track Equipment • Locomotives for mainline switching and all industrial railway service • Clay, Brick and Tile Machinery • Railway Inspection and Gang Cars • Weed Burners • Unistrut Metal Framing

Union Pacific Reports Iron-Titanium Ore Find

UNION PACIFIC RAILROAD announced at the Denver meeting of the Colorado Mining Association in January that it has discovered a titanium-rich iron ore deposit in an area of some 250 sq mi on Iron Mountain, near Laramie, Wyo. In anticipation of development of the orebody, the firm has completed a survey for a 30-mi spur to the area.

Announcement of the discovery was made by William Reinhardt, Union Pacific vice-president, who said that part of the ore has been found to average 46% iron and 19% titanium. The railroad owns or controls at least 60% of the deposits.

A report on the development was made at a technical meeting in Denver by James A. Marsh, Union Pacific's chief geologist, and Don B. Pinnell, field manager of explorations and development, who has been directing the work. Based upon the 178-million ore tonnage estimate of 1952, their report showed that the deposit should contain approximately 45-million tons of iron and 10-million of titanium.

AEC Opens Lands For Uranium Mining

AEC ANNOUNCED Jan. 29 the opening of Federal lands on the Colorado Plateau for uranium mining. The lands had previously been covered by oil and gas leases.

Joseph Campbell, of the AEC, estimated the newly-opened area at about 60,000 sq mi.

Some of the newly-opened lands are known to contain uranium ore deposits, but the extent of the orebodies is not known.

Last summer Congress passed a law validating claims filed prior to Jan. 1, 1953, on Federal lands covered by oil and gas leases. The new order validates claims filed since that date and authorizes future claims.

White Pine Water Intake Ready For Spring Opening

WHITE PINE COPPER CO. holed through to its new water intake on Lake Superior Jan. 17 when workers hit the 12 ft downshaft "right on the nose." The intake will be opened sometime this spring.

The 2600-ft tunnel from the shore, 5x7 ft in cross section, was started Jan. 8, 1953. The downshaft was brought from the lake bottom by means of a caisson, placed by the Zenith Dredge Co., Duluth, Minn. The downshaft was capped and a raise driven to meet it. When the intake is opened, the cap will be removed, leaving a grill at the mouth of the intake.

A discussion of the project appeared in *E&MJ*, November 1953, when readers offered suggestions on the construction methods to be followed by the contractor.

SEND FOR THIS 32 PAGE MULTICLONE BOOKLET

HELPFUL-INFORMATIVE IT OUTLINES THEORIES AND BASIC PRINCIPLES OF CENTRIFUGAL DUST RECOVERY!

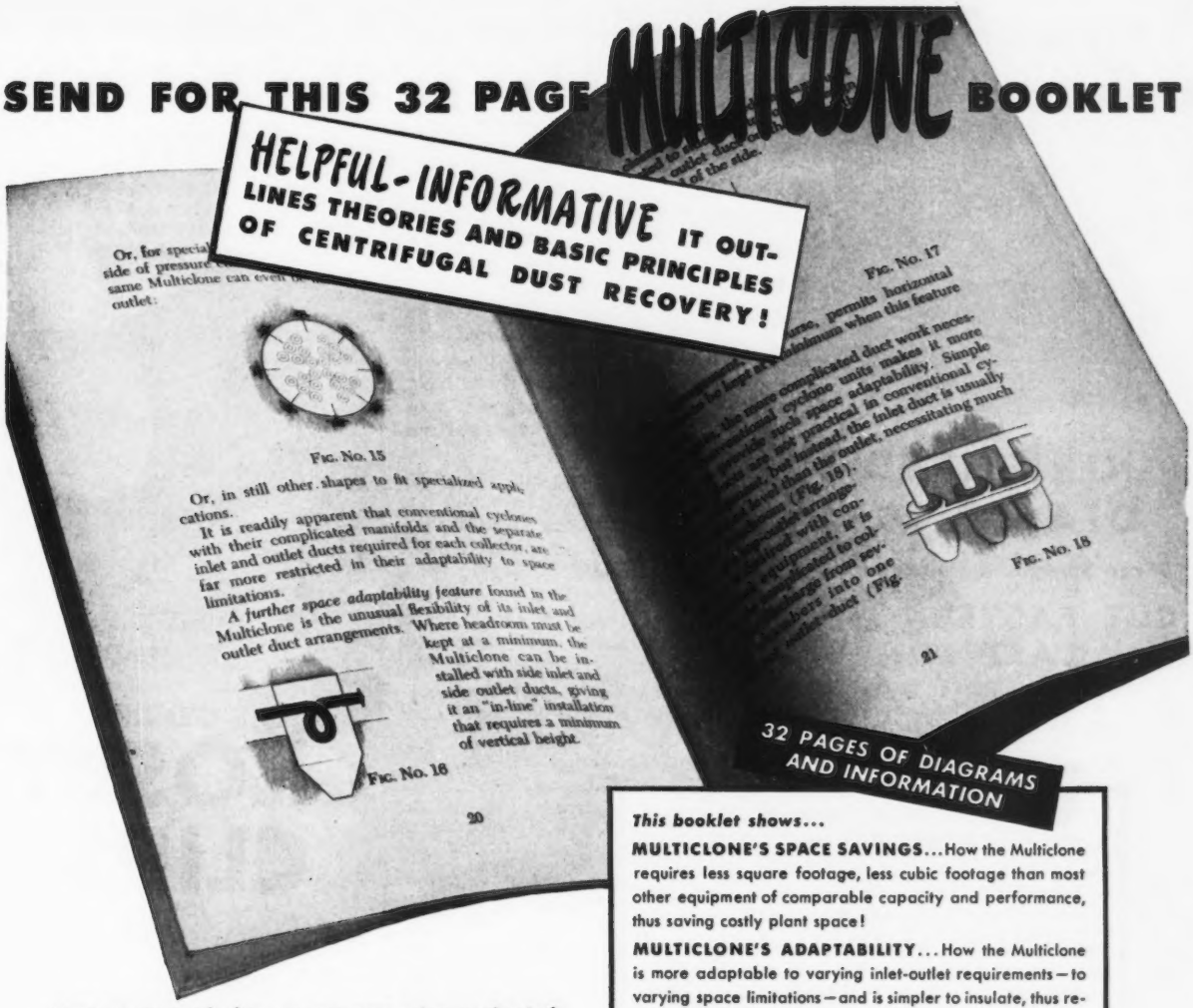


Fig. No. 15
Or, in still other shapes to fit specialized applications.
It is readily apparent that conventional cyclones with their complicated manifolds and the separate inlet and outlet ducts required for each collector, are far more restricted in their adaptability to space limitations.
A further space adaptability feature found in the Multiclone is the unusual flexibility of its inlet and outlet duct arrangements. Where headroom must be kept at a minimum, the Multiclone can be installed with side inlet and side outlet ducts, giving it an "in-line" installation that requires a minimum of vertical height.
Fig. No. 16
20
Fig. No. 17
Fig. No. 18
21
32 PAGES OF DIAGRAMS AND INFORMATION

NO MATTER whether you are now using mechanical dust recovery equipment or are planning the installation of such equipment at some future date, here is a booklet that is full of helpful and valuable information on centrifugal dust recovery. It not only explains the basic methods and principles involved, but also shows the important differences between small and large diameter separating tubes, shows how to simplify your duct work and reduce installation costs, and outlines many other important factors to be considered in selecting mechanical dust recovery equipment.

In addition, this informative booklet illustrates and explains how MULTICLONE'S unique *vane* design is fundamentally different...how it makes possible greater compactness, simpler installation, high recovery of the small particles as well as the medium and coarser ones, and many other facts on MULTICLONE advanced design.

A limited supply of these booklets is available for free distribution to those interested in mechanical recovery equipment and methods. Write for your copy today.

This booklet shows...

MULTICLONE'S SPACE SAVINGS...How the Multiclone requires less square footage, less cubic footage than most other equipment of comparable capacity and performance, thus saving costly plant space!

MULTICLONE'S ADAPTABILITY...How the Multiclone is more adaptable to varying inlet-outlet requirements—to varying space limitations—and is simpler to insulate, thus reducing installation costs!

MULTICLONE'S EFFICIENCY...How Multiclone's multiple *small diameter* tubes, made possible by its exclusive vane design, give higher centrifugal forces and more complete cleansing of *all* suspended particles—even small ones of 10 microns and less!

MULTICLONE'S LOW MAINTENANCE...How the Multiclone has no high speed moving parts to repair or replace, no pads or filters to clean or renew, nothing to choke gas flow or increase draft losses as suspended materials are recovered. Multiclone draft losses remain uniformly low—recovery efficiencies uniformly high—at all times!

Make sure that a copy of this helpful booklet is in your reference files by sending for your copy now!

NOW SELLING...

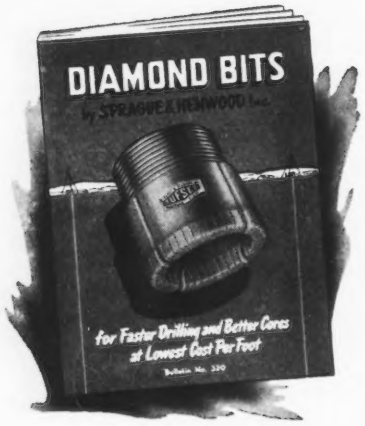
COTTRELL Precipitators
MULTICLONE Collectors
TURBULAIRE Spray Dryers

...in all parts of the U.S.A. and foreign countries.

WESTERN Precipitation CORPORATION

DESIGNERS AND MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1012 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
CHRYSLER BLDG., NEW YORK 17 • 1 N. La SALLE ST. BLDG., CHICAGO 2
1429 PEACHTREE ST. N.E., ATLANTA 5 • HOBART BLDG., SAN FRANCISCO 4
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL



"ORIENTED" DIAMONDS

Make Sprague & Henwood Bits

CUT FASTER— LAST LONGER

Always a leader in its field, Sprague & Henwood, Inc. PIONEERED the development of ORIENTED Diamond Bits; in which each individual diamond is set with its hardest rib or "vector" toward the work.

As of the present date we have produced more than FIVE THOUSAND oriented bits, in a wide variety of types and sizes, with both cast and powdered-metal matrices; and have proved, by extensive comparative tests in our own contract drilling operations, that they cut much faster and last much longer than bits in which the diamonds are set at random.

Only selected diamonds of certain crystalline structure can be used and only specially trained and equipped setters of more than usual aptitude can be relied upon to orient diamonds correctly in the mold, but we are now fully organized for efficient production of ORIENTED DIAMOND BITS, at no additional cost to the purchaser.

In terms of footage cost, these are the most economical diamond bits ever produced and we invite inquiries on that basis. Bulletin No. 320 illustrates and describes all types and gives complete working data.

CONTRACT DRILLING

We do drilling by contract and are one of the oldest and largest contractors for any type of core drilling. Experienced crews are available on short notice for service anywhere in the United States and many foreign countries. Estimates submitted promptly on request.

Sprague & Henwood, Inc.
SCRANTON 2, PA.

Branch Offices: New York, Philadelphia, Pittsburgh, Grand Junction, Colo., Buchans, Newfoundland

Taft-Fletcher Debate

(*Continued from p 77*)

suggestion that "we should encourage U.S. investment abroad . . ." manufacturers should realize that we are setting up competitive units, and it is not inconceivable that in the long run the United States may find that through its investments, it will have lost its competitive position. Ford, General Motors, and other manufacturers can build foreign plants, or assembly units to utilize cheap labor, but you cannot move a domestic mine, nor would I advocate removal of immigration restrictions.

I assume that since Mr. Taft's talk, some Westerners must have told him that he was mistaken about the interpretation of the clipping from the New York Times of Nov. 1, 1953, with a date line of Park City, stating, "Since other industries in Utah and neighboring states are prosperous, there is little or no visible hardship; the mine workers have been absorbed." So, I will make no further comment on that point.

I am in full accord with Mr. Taft's closing remarks that we should work "for the entire interest of the whole team, the people of the United States of America."

That is why I think it is unfortunate that outstanding men like Mr. Lewis Douglas in his report to the President on British-American trade, Mr. Henry Ford II in his address "Expanded Trade and World Peace" and the recommendations for free trade and elimination of tariff barriers by Mr. Coleman, President of the Detroit Chamber of Commerce, and the conclusions of a majority of the Randall Commission—all tend to encourage the lessening of the production of raw materials in the United States.

Fortunately, however, we still have men in Congress like Messrs. Reed, Simpson, and Milliken, who had the courage and foresight to say in their minority Randall Commission report:

"The Report recommends aid to these improved and improving foreign nations through reductions in our tariff—at the expense of American industries, American workers, and American agriculture. It contemplates only the opening up of American markets to give larger shares to producers in foreign countries with resulting smaller shares to our own producers. There are no constructive recommendations for actions which will expand world trade to the benefit of all countries."

I believe that the United States should have more, not less, production of domestic raw materials.

RAISE JOB SAFETY!

USE GENUINE
CROSBY CLIPS
your
"SYMBOL OF SAFETY"

When you see the Crosby Clip's Red "U" Bolt, you know the "job is safe!" Made of drop-forged steel and hot-dip galvanized, there's an *extra margin of safety built in!* Insist on genuine Crosby Clips—available in all sizes.

Wherever you are, there's a Crosby Clip distributor.

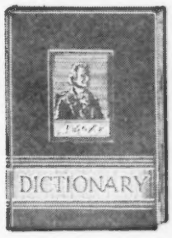
LOOK FOR THE

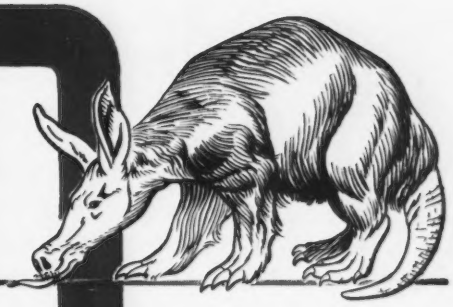
Crosby Products
Division of
American Hoist & Derrick Co.
St. Paul 1 • Minnesota

"AARDVARK,"

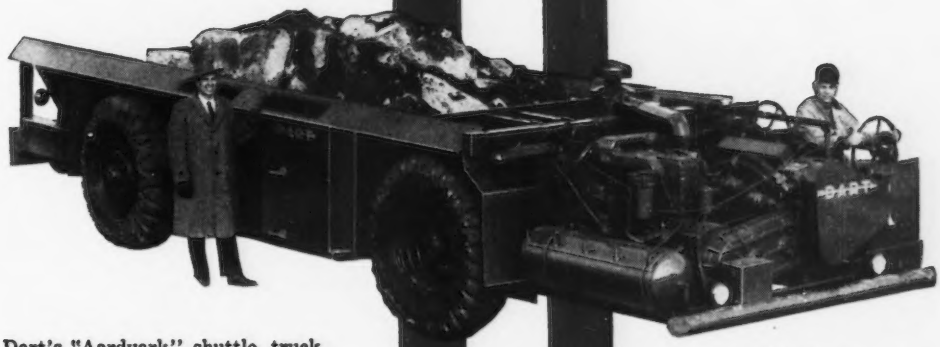
First Word in Webster...

(S. Afr. D., earth pig.) A large burrowing nocturnal African mammal with extensile tongue, powerful claws, large ears and heavy tail that feeds largely on termites.





Last Word in TRUCKS!



Dart's "Aardvark" shuttle truck, just 66 in. high operates equally well "going or coming." Driver's seat swivels to dual controls. Its 18 Ton load is unloaded in a matter of seconds by an hydraulically actuated, apron-type conveyor. 275 H. P. Diesel is exhausted through a scrubber.

Dart's 18-s-ug-s

DART

With many "Firsts" to the company's credit, DART'S new Aardvark is a noteworthy addition to the list—first Diesel powered underground shuttle truck.

Time-tested and operation-proved, the new DART offers mine operators a great potential in increased tonnages—and lower haulage costs.

If your operation requires the movement of material underground, it will pay you to write for performance data, complete specifications on the new "Aardvark."

DART TRUCKS
Kansas City 8 Missouri
SUBSIDIARY OF THE CARLISLE CORPORATION

How INDIVIDUAL DESIGN Speeds Up Ore Loading

Watch a Bucyrus-Erie at work and you'll see that it loads fully and quickly, swings smoothly under sure control of the operator, dumps its load accurately — delivers the fast smooth cycle that means big output.

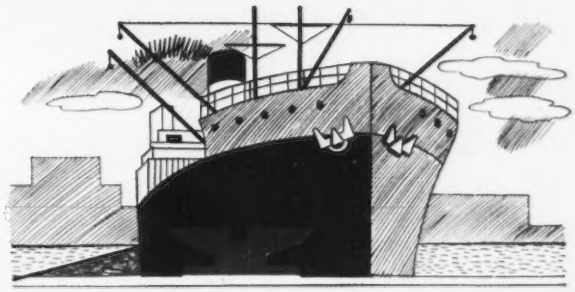
Behind this precision blending of operating functions is the Bucyrus-Erie *individual design* that gives each machine the right balance of speed, power, strength, and weight to handle its big loads most effectively. Every Bucyrus-Erie has the built-in individuality that makes it *just right* for its job range. That's why Bucyrus-Eries are so consistently ahead in output on ore loading operations.

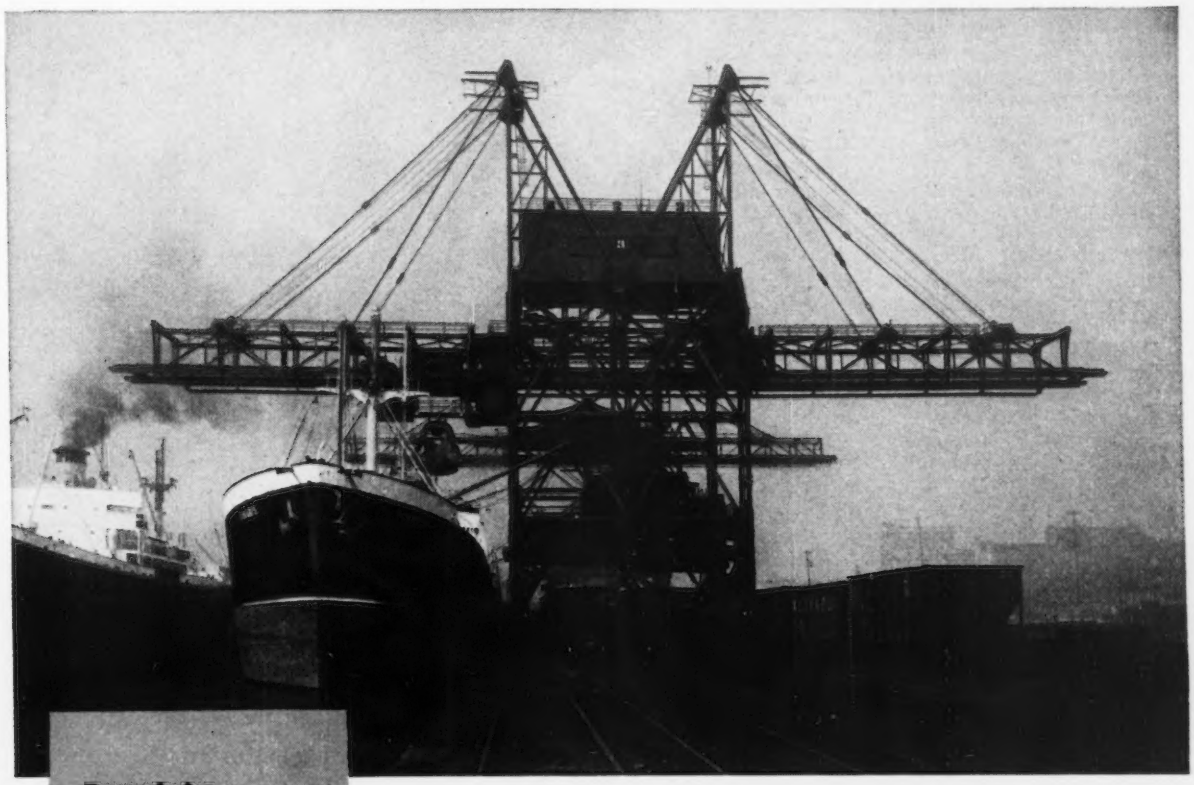
If your pit needs call for shovels or draglines with gasoline, diesel or single-motor electric power in the 3/8- to 4-cubic yard size range, see your Bucyrus-Erie distributor for complete details on how you can step up output with a Bucyrus-Erie — the line that features Individual Design for each model.

43E53

BUCYRUS-ERIE COMPANY ♦ South Milwaukee, Wisconsin

you can't show a profit while the cargo's in the boat





Brownhoist equipment speeds material handling in ports all over the world

There's no profit in a shipment of bulk cargo until you get it out of the boat and put it to work for you. The quicker and cheaper you can do this, the bigger your profit will be. BROWNHOIST builds a variety of special equipment for handling bulk materials in large quantities rapidly and efficiently. The 15 gross ton boat unloader you see here, for example, can unload 1200 tons of ore an hour. It has a reach of 70 feet from the face of the dock on either side. The unloader is equipped with adjustable voltage control which gives extremely smooth operation and maximum production. BROWNHOIST also builds traveling bridge cranes, fast plants, storage bridges, car dumpers, locomotive cranes and clamshell buckets. Each machine is specifically engineered to do the job it is designed for as quickly and as economically as possible. For information about BROWNHOIST equipment to meet your requirements, consult your nearest BROWNHOIST representative or write us today.

BROWNHOIST

builds better cranes

175

CLAMSHELL BUCKET

250 TON WRECKING CRANE

COAL-ORE BRIDGE

CAR DUMPER

INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Cleveland, San Francisco, Chicago, Montreal, Q. • AGENCIES: Detroit, Birmingham, Houston, Los Angeles

ROWEN WINDBOX SEAL

Increases Production, Lowers Costs,

Improves Product Uniformity

Increased sinter production, lowered costs and a more uniform product result with the use of the Rowen windbox seal* on the new Dwight-Lloyd machine. The seal completely eliminates air leakage between pallets and windbox, with these results:

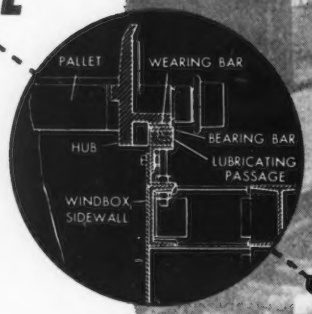
a more uniform product – sinter at edge of pallet gets same amount of air as sinter in the center.
greater production – more efficient burning permits faster operation.
lower operating costs – less air is needed to do the job.

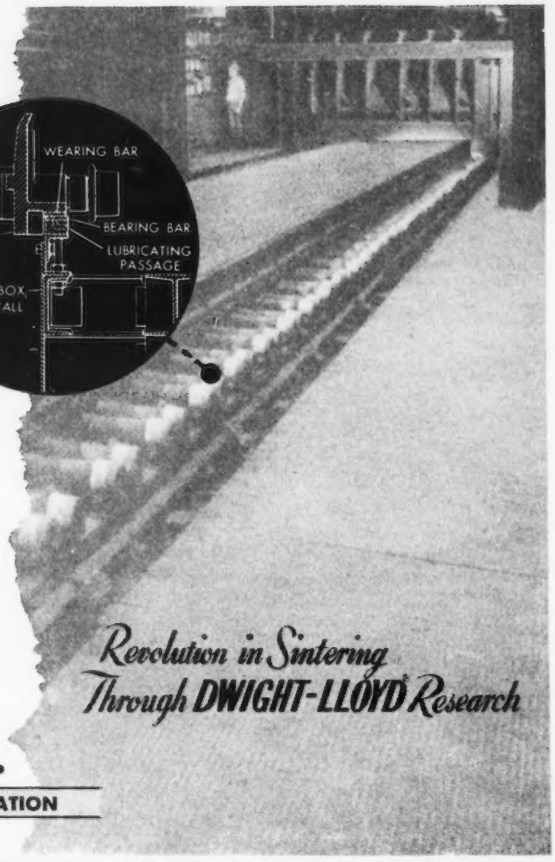
The Rowen windbox seal is the result of intensive research by our engineers. It is another major Dwight-Lloyd contribution that has maintained sintering as a modern, economical process.

Among the other exclusive features of the new Dwight-Lloyd machines are: *Upper windbox* – for updraft or downdraft operation. *Compound discharge curve** – eliminates spillage, controls pallet drop, cuts pallet wear. *Roll feeders* – assure an even distribution of charge on pallets.

Write for detailed information.

*PATENTED



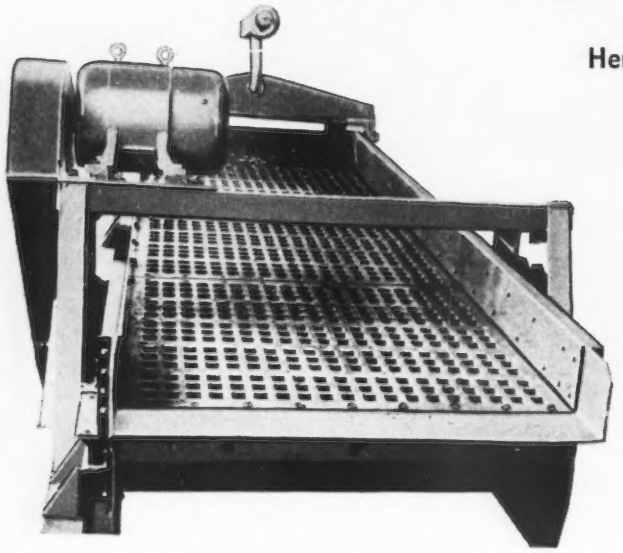


DWIGHT-LLOYD, Inc.

DIVISION OF SINTERING MACHINERY CORPORATION

120 Sinter Avenue, Netcong, New Jersey

Takes Rough Treatment in its Stride



Hendrick Perforated Metal Plate takes the knocks and bruises of constant heavy-duty screening without altering uniformity of material. Because the holes can not stretch, Hendrick Perforated Plate assures large quantity screening without expensive, time-wasting blinding. Supplied either flat or corrugated, Hendrick Perforated Metal is available in any desired shape and size of openings in high carbon, stainless steels and in other commercially rolled metals. Write for further details — or phone Hendrick direct.

SEE OUR CATALOG IN SWEET'S

Hendrick

MANUFACTURING COMPANY

70 DUNDAFF STREET, CARBONDALE, PA.

Sales Offices in Principal Cities

Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids

Wire Rope at Work — Here's a load that required deft manipulation by three cranes working as a team. The absorption tower being guided into place was 98 ft long, 11 ft in diameter, and weighed more than 33 tons.

For the lifting and placing of this big, cumbersome load, the cranes were rigged with Bethlehem wire rope, Purple Strand grade, in the 6 x 25 construction; sizes, ⅞-in. and ¾-in. A typical assignment for Bethlehem rope, which so capably handles the toughest lifting and hauling jobs in every kind of industry.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

MINING • CONSTRUCTION • PETROLEUM • EXCAVATING • QUARRYING • LOGGING • MANUFACTURING

BETHLEHEM STEEL

BETHLEHEM WIRE ROPE

The Mining Might of Manitowoc 4500

Means More Production!

Manitowoc 4500 with 5½ yard dipper stripping ore.

Manitowoc 4500 with 140' boom and 4½ yd. dragline stripping and stockpiling coal.

The mighty Manitowoc 4500 is the big "pro" of mining operations all over the country — the complete answer on "how to get more production — more profit per shift."

Look at Manitowoc's features that mean bigger yardage on every job — smooth, positive-action torque converter; fast operating cycles; special design long-reaching booms; hi-lift shovels; crawler-type mounting for faster traveling over all kinds of grades up to 30%; complete diesel operation which permits traveling anywhere without a trailing cable or electric supply; wide pads and wide crawlers that result in far lower ground pressure.

See the Manitowoc before you buy your next shovel or dragline — see for yourself why the big swing is to mighty Manitowoc.

MANITOWOC ENGINEERING CORP. • MANITOWOC, WIS.

MANITOWOC
SHOVELS 1-5 YD. Speedcrane CRANES 18-100 TON

the Torque Converter makes the difference

Precise Control

"Fraction of an inch" control by either hand throttle or foot accelerator, without slipping clutches or shifting speeds.

Smoother Operation

Cushion of oil absorbs jarring impacts which saves cables, clutches and machine assemblies.

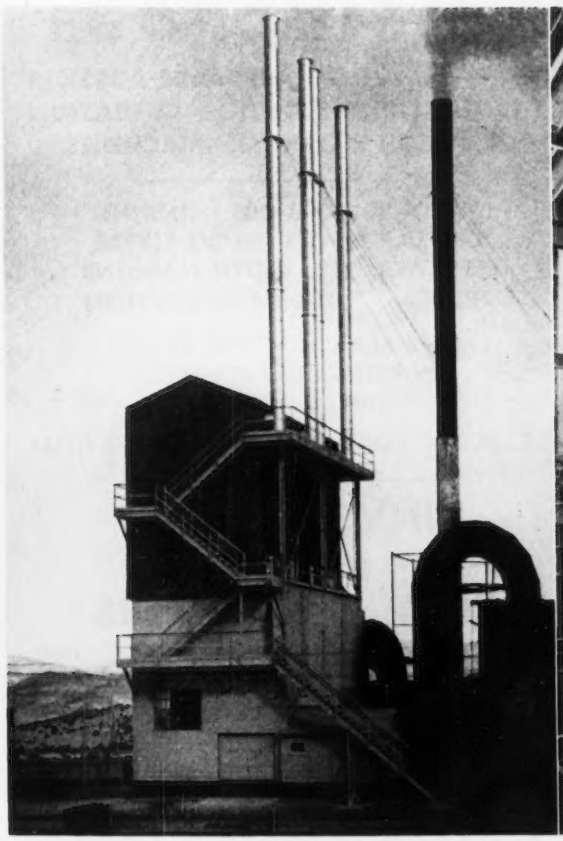
Balanced Power-Load

Engine operates at maximum efficiency at all times . . . full engine power under full load, just enough power for light loads . . . assuring economy of operation. Engine cannot stall and develops full "lugging" power. Load requirements and engine horsepower always automatically balanced.

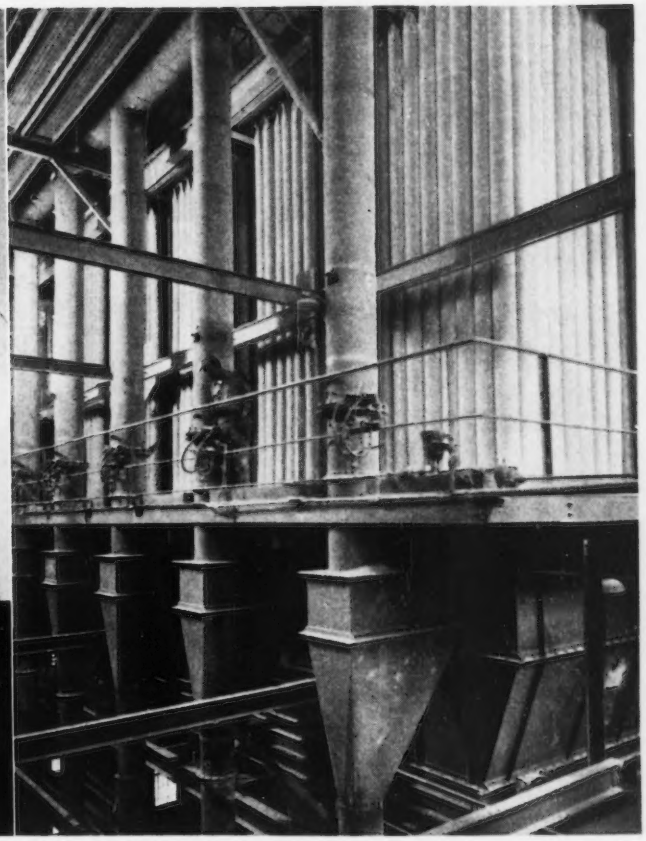
Infinite Speeds

No gears, but all the advantages and none of the disadvantages of automatic, multi-speed transmissions. An infinite number of speeds at your command without shifting, since speeds and power are automatically balanced at all times.

pioneering developments keep **DUSTUBE®** *first in dust and fume control*



Custom designed continuous automatic Dustube Collector filtering 25,000 c.f.m. gases from a Dwight-Lloyd sintering machine at The New Jersey Zinc Co., Empire Zinc Div., Canon City, Colorado.



Automatic filtration of zinc oxide fume from production units is accomplished in this custom designed continuous automatic Dustube Collector at The New Jersey Zinc Co. (of Pa.), Palmerton, Pa.

DUSTUBES—custom designed for the mining and metallurgical industry

Dustube Collectors are individually designed for the rigorous dust and fume applications of the mining and metallurgical industry. They have the inherent capacity for continuous, severe service at high filtration efficiency, with a minimum of down time for maintenance. Uniform recoveries approaching 100% are commonplace. Hot and/or corrosive gases are efficiently handled through use of synthetic filtration fabrics. Automatic units can be designed to permit interior inspection and maintenance of the Dustube without shutting down.

Dustubes can be custom designed to readily fit existing or new plant buildings flue lines and ground contours. Various arrangements of hoppers and hopper discharge mechanisms are available — including steep-sloped pyramid hoppers with rotary, double-dribble or slide gate valves; trough type hoppers with screw conveyors, or flat-bottom hoppers with built-in scraper conveyors.

All collected fume or dust is automatically conveyed to one central point, thus eliminating expensive hand labor in handling valuable by-products. Collected materials may be reprocessed without dewatering, filtering, or drying.

Our engineers are at your service to assist you in your filtration problems. It will pay you to investigate the many advantages of Dustube Collectors. Write for complete information today.

NEW 40 page Catalog

This new guide to dust and fume control contains practical charts and useful information. Write for Catalog 72-B.

American
WHEELABRATOR & EQUIPMENT CORP.
438 S. Byrkit St., Mishawaka Ind.

dustube®
COLLECTORS

fact:

nothing in the world is as hard as a diamond

FACT: *in grinding carbides* — nothing cuts as fast, as cool and as economically as a diamond wheel.

FACT: *in drilling* — diamond bits give lowest cost per foot in hard geological formations.

FACT: *in dressing grinding wheels* only diamond dressers will do the job where fine finish, high production or intricate forms are involved.

FACT: *in wire drawing* — diamond dies assure accurate sizing, bright finish and high output.

FACT: *in lapping* — diamond compounds and powders save countless skilled man-hours by producing wanted sizes and finishes faster.

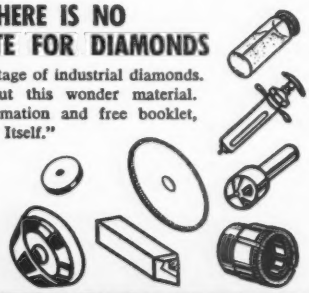
FACT: *in cutting* — diamond cutting and boring tools are standard for tough jobs where the best of competitive materials fail.

FACT: *in sawing* — diamond saw blades feature speed and economy on quartz, concrete, stone, sapphire, glass and diamond.

FACT: **Diamond Tooling gives you precise production, more production, uninterrupted production, *lowest cost production.***

IT IS A FACT . . . THERE IS NO ECONOMIC SUBSTITUTE FOR DIAMONDS

News Note: there is not a shortage of industrial diamonds. Learn the detailed facts about this wonder material. Write today for specific information and free booklet, "The Diamond That Pays For Itself."



INDUSTRIAL DIAMOND ASSOCIATION OF AMERICA, Inc.

124 East 40th Street, New York 16, N. Y.

DIVIDENDS

YES — DIVIDENDS ARE MADE POSSIBLE THROUGH THE SUPERIOR OPERATION OF BOOTH FLOTATION MACHINES.

VARIATIONS IN ORE GRINDING OR PULP DENSITY HAVE LITTLE EFFECT ON THE BOOTH MACHINE
RESULT — STEADY OPERATION

MORE AERATION AND BETTER PULP CIRCULATION WITH REDUCED REAGENTS
RESULT — COST REDUCING OPERATION

INVESTIGATE

WRITE FOR INFORMATION

BOOTH ENGINEERS

146 So. West Temple • Salt Lake City 1, Utah

MINERALS SEPARATION • SERVICE• EQUIPMENT

CORE DRILLING

"We look into the Earth"

—anywhere!

- Mineral Prospecting
- Foundation Test Borings and Grouting
- Large diameter holes for Ventilation and Escapeways

PENNSYLVANIA Drilling CO.

DRILLING CONTRACTORS & MFRS.

1205 Chartiers Ave. PITTSBURGH, PA. WAlnut 1-5816

ALLUVIAL DEPOSITS

Gold Tin Columbite Titanium Bauxite

Most accurately and economically tested for . . . with the

EMPIRE DRILL

NEW YORK ENGINEERING COMPANY

75 West St., N. Y. City, U.S.A. Cable Address NYECO, N.Y.

Why you get lower cost per ton of production with

SHEFFIELD MOLY-COP

TRADEMARK REG.

COPPER • MOLYBDENUM • ALLOY GRINDING BALLS

Mining and milling operations the world over record important net savings when the change is made to Sheffield Moly-Cop Grinding Balls.

You get this economy and better quality production because Sheffield Moly-Cop Grinding Balls are unusually tough, have greater resistance to abrasion, and retain their spherical shape longer. The reason: Sheffield's exclusive alloy and automatically controlled manufacturing methods produce a ball of finer, denser, more uniform structure. The result: fewer chargings, less "down time", high production rate.

Your nearest Sheffield representative will show you how Sheffied Moly-Cop Grinding Balls will save costs in your operation. Get in touch with him now.

Export Representatives: ARMCO INTERNATIONAL CORP., MIDDLETOWN, OHIO

SHEFFIELD STEEL CORPORATION

HOUSTON KANSAS CITY TULSA

SUBSIDIARY OF ARMCO STEEL CORPORATION

STRAUB

HAS RIB-CONE MILLS FOR ALL GRINDING OPERATIONS

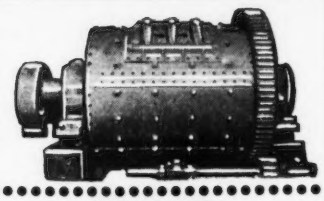
More than 100 sizes and types of ball mills. 40 years of experience in supplying every conceivable grinding requirement is at your disposal in the form of engineering counsel. *An inquiry to our engineering department will bring a prompt reply.*

STRAUB MFG. CO.

622 CHESTNUT STREET • OAKLAND 20, CALIF.

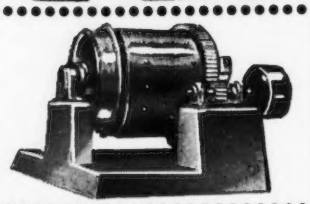
SECTIONALIZED MILL

Completely assembled in our shop, then marked and knocked down for shipping "Anywhere a Mule Can Go."



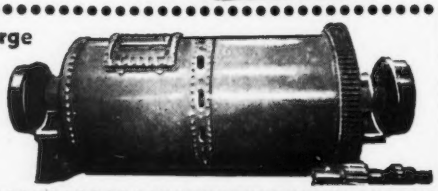
SCREENING MILL

Most economical type. Particularly suited to amalgamating and concentrating classes of ores. Capacity from 2 to 95 tons per 24 hours.



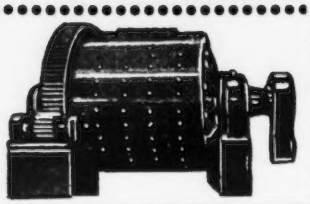
Peripheral Discharge MILL

Particularly suitable for producing a granular product. Designed for controlled grinding of tungsten and similar ores where sliming must be eliminated.



LOW PULP LINE MILL

One of the new Champion Series. Available in low pulp line, plain overflow, screening and convertible types with capacities ranging from 25 to 250 tons per 24 hours.



★ More than 100 Sizes and Types of RIB-CONE Ball Mills.

A tip for top performance

TeeCee
TUNGSTEN CARBIDE

&

"TYPE L"
ONE PASS STEEL

LIDDICOAT

DETACHABLE
DRILL BITS

MANUFACTURED BY

Thompson Products

THOMPSON PRODUCTS LTD. • ST. CATHARINES, ONT.

CLASSIFIED ADVERTISING

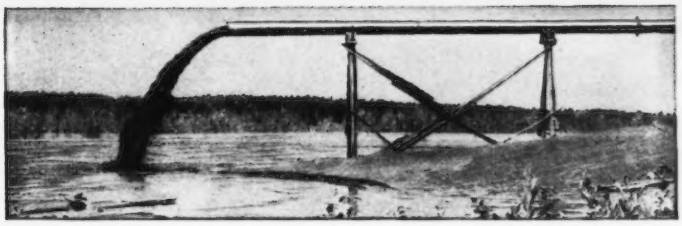
for bringing business needs or opportunities to the attention of men associated in administrative, executive, management, sales and responsible technical, engineering and operating capacities with the industries served by

The SEARCHLIGHT SECTIONS of

American Machinist
Aviation Week
Bus Transportation
Business Week
Chemical Engineering
Chemical Week
Coal Age
Construction Methods & Equipment
Electrical Construction & Maintenance
Electrical Merchandising
Electrical World
Electronics
Engineering News-Record
Engineering & Mining Journal
E & M J Markets
Factory Management and Maintenance
Fleet Owner
Food Engineering
Nucleonics
Power
Product Engineering
Textile World
Welding Engineer

For advertising rates or other information address:
Classified Advertising Division

McGRAW-HILL PUBLISHING CO., Inc.
330 W. 42nd St., New York 36, N. Y.



Pushing Abrasive Tailings through 7700 feet of 18-inch disposal pipe is hard on pumps. But Hydroseals perform with minimum maintenance because impeller, shell and suction sleeve are made of NI-HARD (ASH-21 alloy).

Allen-Sherman-Hoff uses NI-HARD to solve one of the Mesabi's toughest jobs

Impeller and Shell... as well as the suction sleeve... are cast in NI-HARD (ASH-21 alloy) to greatly lengthen the life of Hydroseal pumps in spite of the terrific loads they carry. By their resistance to wear and abrasion, these nickel-chromium white iron parts hold maintenance costs to a minimum.

In operation for one of Minnesota's largest iron ore producers, two G-Frame Hydroseals take turns pumping hard, abrasive tailings. They pump at the rate of 446,400 gallons of slurry per hour. The solids amount to 450 long tons per hour.

The Allen-Sherman-Hoff Pump Co. of Wynnewood, Pennsylvania, manufactures Hydroseal pumps... known the world over.

And this manufacturer can proudly point to the relatively low maintenance expense of the Hydroseals handling one of the toughest jobs in the Mesabi Iron Range.

From wide experience in developing and building sand, slurry and dredge pumps, Allen-Sherman-Hoff engineers know that Ni-Hard® is the most abrasion resistant material commercially available. That's why they specify Ni-Hard (ASH-21 alloy) for impellers, shells and suction sleeves in Hydroseals.

Make use of our 20 years' practical experience in the Ni-Hard field to help you find out how Ni-Hard will *stand the gaff* on your particular applications.

The completely revised third edition of "Engineering Properties and Applications of Ni-Hard" is now available. Write for your copy today.

INCO

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

he's working for you

THIS FELLOW IS TRAINED IN YOUR BUSINESS. His main duty is to travel the country — and world — penetrating the plants, laboratories and management councils . . . reporting back to you every significant innovation in technology, selling tactics, management strategy. He functions as your all-seeing, all-hearing, all-reporting business communications system.

THE MAN WE MEAN IS A COMPOSITE of the editorial staff of this magazine. For, obviously, no one individual could ever accomplish such a vast business news job. It's the result of many qualified men of diversified and specialized talents.

AND, THERE'S ANOTHER SIDE TO THIS "COMPOSITE MAN," another complete news service which complements the editorial section of this magazine — the advertising pages. It's been said that in a business publication the editorial pages tell "how they do it"—"they" being all the industry's front line of innovators and improvers — and the advertising pages tell "with what." Each issue unfolds an industrial exposition before you—giving a ready panorama of up-to-date tools, materials, equipment.

SUCH A "MAN" IS ON YOUR PAYROLL. Be sure to "listen" regularly and carefully to the practical business information he gathers.

McGRAW-HILL FOR BUSINESS

McGRAW-HILL PUBLICATIONS

Chicago Pneumatic

8 East 44th Street, New York 17, N.Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Professional Services

ASSAYING
CONSULTING
PROSPECTING
ORE TESTING

RESEARCH
METALLURGY
MILL DESIGN
MINE MANAGEMENT

AGENCE MINIERE & MARITIME S.A.
Sworn weighers, samplers & Assayers of Ores, Metals. Representatives of shippers at European ports & Works.
Market surveyors and commercial advisers assuring sales direct to consumers
2, rue Van Bree, Antwerp, (Belgium)

E. LEE HEIDENREICH, JR.
Consulting Engineers
Crushing Plants — Quarries
Milling Plants — Plant Design
Plant Layouts — Appraisals
75 Second St., Newburgh, N. Y.
9 So. Clinton St., Chicago 6, Ill.

ARNOLD H. MILLER
Consulting Engineer
General Mine, Mill and Industrial Appraisals
Plant Design, Mechanization and Improvement
Cable: "ALMIL," Tel. Cortland 7-0635
120 Broadway, New York 5

SMITH-EMERY CO.
Assayers and Chemists
SPECTROGRAPHIC ANALYSES
781 E. Washington Blvd.
Los Angeles 21, Calif.

BEHRE DOLBEAR & COMPANY
Consulting Mining Engineers and Geologists
11 Broadway, New York 4, N. Y.

HERON ENGINEERING CO.
Consulting Engineers for all types of Aerial Tramways, Cableways, and Suspension Structures
2000 South Acoma St.
Denver 19, Colorado

ARTHUR NOTMAN
Consulting Mining Engineer
55 Liberty St., 18th Floor
New York 5, N. Y., U.S.A.
Telephone BArclay 7-9484

SPANSKI and WILLIAMSON
Engineers — Geologists
Groundwater Exploration
Mineral Prospecting and Evaluation
Investigations and Reports
P.O. Box 151 Springfield, Illinois

BLANDFORD C. BURGESS
Consulting Engineer
Industrial Mineral Specialist
Appraisals — Mineral Surveys
Plant Design
Prospecting Development—Efficiency
Ground Water Studies
Box 350 Monticello, Ga.

V. CLAIBORNE KILBY
Chemist
Ore Analysis
Milton N. C.

RODGERS PEALE
Consulting Mining Geologist
315 Montgomery Street
San Francisco 4, Calif.

MARVIN J. UDY
Inorganic Chemistry Electrochemistry
Electric Furnace Smelting
Process Metallurgy
Ferro-Alloys, Calcium Carbide, Phosphorous
Telephone 2-6294
546 Portage Rd., Niagara Falls, N. Y.

DICKINSON LABORATORIES
Assayers—Chemists—Metallurgists—Umpire Work
Ore Shippers Representatives at Local Plants
Samplers - Analysts at Mexican Border Points
1300 West Main St. El Paso, Texas

KELLOGG KREBS
Metallurgical Engineer
Mineral Dressing Consultant
564 Market St. Telephone:
San Francisco 4, Calif. SUtter 1-6613

AMEDEE A. PEUGNET
Consulting Mining Engineer
Telephone MAin 1431
705 Chestnut St., St. Louis 1, Mo.

WALKER & WHITE, Inc.
Umpire, Assayers, Chemists
Shippers Representatives
409 Pearl St. New York City

GEO-RESEARCH
Geology Geophysics Mineralogy
Consultants
A Division of the Institute of Industrial Research
Syracuse 10, N.Y., Phone: 4-6454

LEDOUX & COMPANY, Inc.
Metallurgical Chemists — Assayers
Spectroscopists
Samplers—Weighers
Representatives of Shippers of Ores and metals at Buyers Works
Office and Laboratories
359 Alfred Ave., Teaneck, N. J.

ROGER V. PIERCE
Mining Engineer Specialist
Underground Mining Methods. Cost Cutting Surveys—Production Analysis Mine Mechanization—Mine Management.
1596 Wasatch Dr., Salt Lake City, Utah

HARRY J. WOLF
Mining and Consulting Engineer
Examinations — Valuations — Management
420 Madison Avenue
New York 17, N. Y.
Cable: MINEWOLF
Tel.: Plaza 9-1700

ABBOT A. HANKS, INC.
ASSAYERS—CHEMISTS
Est. 1866
Spectrographic Analysis
Shippers Representative
624 Sacramento Street
San Francisco 11

ROBERT S. MAYO
Civil Engineer
Complete Equipment for Concrete Lining of Tunnels, Haulageways and Shafts. Special Equipment for Underground or Subaqueous Construction.
Lancaster, Penna.

LUCIUS PITKIN INC.
Mineralogists—Assayers Chemists—Spectroscopists
SHIPPERS REPRESENTATIVES
Main Office—Laboratories
Pitkin Bldg.—17 Fulton St.
New York 7, N. Y.

WORLD MINING CONSULTANTS, INC.
Consulting Mining Engineers and Geologists
220 Broadway, New York 38, N. Y.
Worth 2-2934

Call in a SPECIALIST to solve that problem...

Experiment takes time—so why not save time by calling in a specialist who has already gone over the ground you are now exploring?

Engineering & Mining Journal, the meeting place of mining men in all parts of the country, points the way to the solution of many mining problems through its Professional Service Section.

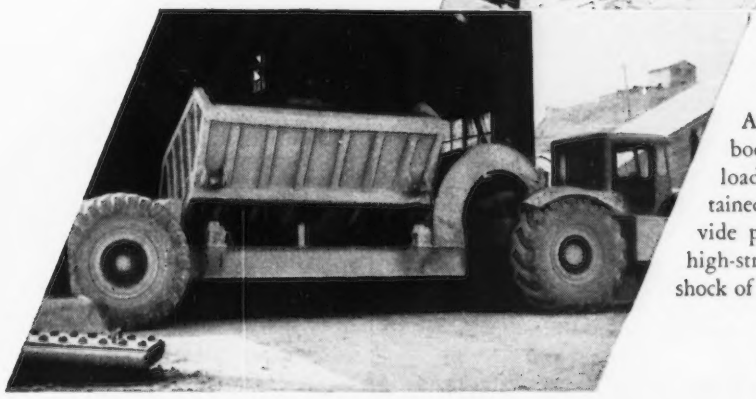
Why not tell one of these specialists about YOUR problem?

FAST LOADING . . .

The low, wide body of the Athey PD10Q makes an easy target for fast-swinging shovels—so the body can be heaped to a full load in a hurry. The body is constructed of high-quality tensile steel to withstand loading shocks. Big tires give traction for action in any footing.

FAST HAULING . . .

The PD10Q is teamed with the high speed Cat DW10 Tractor to haul full payloads at speeds up to 24.5 MPH. Low height gives a low center of gravity for maximum stability at high speeds, yet there's plenty of clearance underneath. Non-stop turns can be made in a 26′ radius.



FAST DUMPING . . .

A fast-acting three-stage hoist tilts the body to 45° in either direction. ALL the load spills out quickly. Stability is maintained even on new fill. Large air brakes provide positive stopping power. All-welded, high-strength steel frame absorbs twist and shock of loading, hauling and dumping.

Picture shown is of St. Mary's Cement Co. Ltd., operations at St. Mary's, Ontario.

FAST PROFITS

WITH THE ATHEY SIDE DUMP QUARRY TRAILER!

Speed in every phase of the cycle means higher production and lower costs and the Athey PD10Q is designed and built for speed, capacity and endurance. Your Athey-Caterpillar Dealer can prove—with facts, figures or a demonstration—that the Athey PD10Q Quarry Trailer can cut your costs and boost your profits. Ask him or write direct to Athey Products Corporation.

Athey

PRODUCTS CORPORATION

5631 West 65th Street
Chicago 38, Illinois

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE

$1.20 a line. Minimum 3 lines. To figure advance payment count 5 average words as a line. (See ¶ on Box Numbers.)
POSITION WANTED undisplayed rate is one half of above rate, payable in advance.
PROPOSALS, $1.20 cents a line an insertion.

INFORMATION:

BOX NUMBERS count one additional line in undisplayed ads.
DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).
EQUIPMENT WANTED OR FOR SALE Advertisements acceptable only in Displayed Style.

DISPLAYED RATE

The advertising rate is $12.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.
AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.

Send NEW ADVERTISEMENTS to N. Y. Office, 330 W. 42nd St., N. Y. 36, N. Y. For April Issue closing March 19th.

"TEKTONOMETER"
GEOPHYSICAL SURVEYS
MINING COMPANIES INTERESTED IN THE NEW GERMAN PATENTED AND PROVEN ELECTRONIC "TEKTONOMETER" SURVEY-SYSTEM PLEASE CONTACT
WOLF WILMS
44 WHITEHALL STREET
NEW YORK, 4, N. Y.
U. S. REPRESENTATIVE OF
MONTAN-ELEKTRA GMBH
Marburg (West Germany)

Subsurface Exploration
Discover Ores, Water, Coal, Gravel. Find depth, slope, continuity of Bedrock in Highway, Bridge, Dam or Foundation Engineering Problems.
RESISTIVITY, SEISMIC METHODS.
New Apparatus, New Low Prices
We supply complete instructions.
SOUTHERN
MANUFACTURERS & DISTRIBUTORS, INC.
ARLINGTON 1, VA.

WANTED

We Specialize in Buying Complete Mining, Milling or Construction Plants
We have purchased 14 within three years. Please contact us before you sell.
BO 5701 Engineering & Mining Journal
520 N. Michigan Ave., Chicago 11, Ill.

WANTED
INDUSTRIAL PLANTS
Will arrange thru purchase of (1) capital stock, (2) Assets, (3) Machinery and equipment, whole or in part—Personnel usually retained, strict confidence. Box 1351 Church Street Station, New York 8, N. Y.

WANTED
MONARCH TILTING FURNACE
. . . with five inch egg-shaped lining, capable of maintaining 2800°F.
FRANK DEAN
34 S. Adams St., Westmont, Illinois

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

METALLURGIST, YOUNG, graduate, preferably with some experience in non-metallic flotation. Duties to include direction of control laboratory, test work and operating metallurgy. Salary open, location—South. P-1372, Engineering and Mining Journal.

METALLURGICAL ENGINEER. Ore beneficiation experience. Established New Jersey process manufacturer. Excellent opportunity. P-1762, Engineering & Mining Journal.

POSITIONS WANTED

ENGINEER MINING, Administrative and Planning. 25 years successful and Progressive Foreign and Domestic Mining operations. Open for engagement as manager or General Superintendent. Will consider contingent basis. PW-1622, Engineering & Mining Journal.

CIVIL ENGINEER, M.I.T. and Harvard Business School graduate, now employed, is tired of constant moving connected with heavy construction. Seeks responsible position with mining company where a wide knowledge of construction and civil engineering can be used to its fullest advantage. No objection to foreign work. Stability of location is prime requirement. Age 44, married, fluent French. PW-1745, Engineering & Mining Journal.

CHIEF ACCOUNTANT: Capable chief accountant-office manager, under 40. Broad experience in mining in Latin America. Fluent Spanish. Detailed resume on request. PW-1766, Engineering & Mining Journal.

MINING ENGINEER—25 years experience, management, mining and metallurgical operations, evaluations of mines and prospects. Prefers gold. PW-1767, Engineering & Mining Journal.

GEOLOGICAL ENGINEER, 49, married. Experienced administration, organization, research; exploration, production, markets; nonmetallics, ceramic materials. Desires responsible production or management position; technical direction research, development; or consulting engagement. Professional engineer: Mineral dressing, mining, geology, surveying. Available reasonable notice. PW-1603, Engineering & Mining Journal.

MILLMAN 25 yrs. experience, standard milling practice, domestic & foreign fields go anywhere. PW-1709, Engineering & Mining Journal.

MINING GEOLOGIST, 32 years, Ph. D., nine years experience in all phases of mineral exploration, mine work, ore estimation, research and administration desires responsible position with mining company, location anywhere, available on 40 days notice, PW-1216, Engineering & Mining Journal.

BUSINESS OPPORTUNITIES

For Lease copper-gold mine DMEA approved. 21 patented claims. 12 million production. Shipping ore in sight, equipment lacking. Large mill grade potential. Write C. F. Williams, 110 Camino Pena, Santa Fe, N. M.

900 acres proven manganese lands in heart of Batesville-Cushman quadrangle, will sell; might lease. Write Bee Vanemburg, Owner, Batesville, Arkansas.

To

EMPLOYERS

who advertise

for MEN:

WHEN there are many applicants for a single position it frequently happens that the only letters acknowledged are those of the most promising candidates. Others may not receive any indication that their letters have even been received by a prospective employer much less given consideration. These men often become discouraged, will not respond to future advertisements, and sometimes question their bona fide character.

Every advertisement printed in the Searchlight Section is duly authorized.

It will help to keep our readers interested in this advertising if you will acknowledge every application received, even if you merely return the letters of unsuccessful applicants with, "Position filled, thank you" written or stamped on them. If you don't care to reveal your identity, mail them in plain envelopes.

We suggest this in a spirit of cooperation between employers and the men replying to Positions Vacant advertisements.

"Put yourself in the other fellow's place."

Classified Advertising Division

McGraw-Hill Publishing Co., Inc.

SINCE 1898 DEPENDABLE RECONDITIONED MACHINERY

LOCOMOTIVES

1—2-2½ ton Whitcomb Battery, 24" gauge
1—2½ ton Jeffrey battery or trolley, 36" gauge
1—3½ ton Mancha battery, 25" gauge, with 2 sets Edison batteries and charging set
1—3½ ton Mancha battery, 24" gauge
1—4 ton Westinghouse battery, 24" gauge
1—4 ton Ironton battery, 36" gauge
2—7 ton General Electric permissible battery, 36" gauge
1—7 ton Atlas battery, 36" gauge
3—8 ton Ironton battery, 36" gauge
2—8 ton General Electric battery, 36" gauge
1—10 ton Atlas battery, 36" gauge
1—10 ton Atlas battery, 36" gauge
1—4½ ton Goodman trolley, 36" gauge
1—5 ton Jeffrey trolley, 36" gauge
3—8 ton Ironton battery, 36" gauge
2—8 ton Goodman trolley, 36" gauge

FILTERS

1—3' x 3' Drum Filter
2—4' x 2' Morse Drum Filters
1—6' 2-disc American Filter
1—6' 3-disc American Filter
1—18" Morse Round Pattern Filter Press
1—36" Merrill Triangular Filter Press
1—#12 Sweetland Filter Press, 36 leaves

FLOTATION MACHINES

1—New Morse Jetair 2 cell #7
1—29 x 7 Fagergren Single Cell
1—6 cell 18" Stearns-Roger
2—6 cell Denver "Sub A" #21
1—6 cell new Morse "Jetair" #7
1—New Morse Jetair 6 Cell #30

DIAPHRAGM PUMPS

3—2" New Morse Diaphragm Pumps
2—4" New Morse Diaphragm Pumps
1—2" Dorrco Duplex Pump
1—4" Dorrco Duplex Pump
1—4" Barnes Pump
2—4" Butehart Pumps
1—4" Dorrco Pressure Diaphragm Pump

BALL & ROD MILLS

1—4' x 3' Marcy Ball Mill
1—4' x 3' Morse Ball Mill
1—4' x 4' Marcy Ball Mill
2—6' x 48" Hardinge Conical Ball Mills with air-sweet equipment
1—8' x 22" Hardinge Conical Pebble Mill
1—3' x 8' Marcy Rod Mill
1—3' x 9' Ruth Rod Mill

PORTABLE COMPRESSORS

1—105 CFM Ingersoll Rand Portable Driven by 4 Cylinder Gasoline Engine
1—210 Worthington "Blue-Brute" Portable Driven by Continental 6 Cylinder Gasoline Engine
1—230 CFM Gardner-Denver Compressor, Model WBQ, driven by Buda 6 cylinder gasoline engine, skid mounted
1—240 CFM Schramm Portable Driven by Buda 4 Cylinder Gasoline Engine
2—310 CFM Gardner Denver Driven by Buda 4 Cylinder Gasoline Engine
1—310 CFM Sullivan Driven by Buda 4 Cylinder Gasoline Engine

FEEDERS

1—12" x 6' New Morse "Vari-stroke" Ore Feeder
2—12" New Morse Wet Reagent Feeders
1—New Morse Cone Type Dry Reagent Feeder

HOISTS—ELECTRIC

1—10 HP Vulcan #0 Single Drum
1—15 HP Morse New Single Drum
1—20 HP H&B Single Drum
1—22 HP Vulcan Single Drum #1½
1—30 HP Vulcan, Double Drum
1—30 HP Vulcan Single Drum
1—37 HP Single Drum
2—52 HP Vulcan #4½ Single Drum
1—30 HP Fairbanks-Morse Single Drum
1—60 HP H&B Single Drum
1—60 HP Vulcan #23ELF Single Drum
4—100 HP Box Single Drum
1—112 HP Vulcan Single Drum
2—150 HP Vulcan Single Drum
1—375 HP Dillon-Box Single Drum
1—600 HP Box Single Drum
1—22 HP Vulcan #1½ Double Drum
1—60 HP Ottumwa Double Drum
1—40 HP American 3 Drum
1—80 HP Thomas 3 Drum
1—80 HP Lidgerwood
1—80 HP Clyde 3 Drum

CRUSHERS

4—2¼" x 3½" New Morse Lab Jaw Crushers
5—4" x 6" New Morse Lab Jaw Crushers
1—9" x 15" Wheeling Jaw Crusher
1—9" x 15" Farrell Jaw Crusher
1—9" x 24" Rogers Jaw Crusher
1—8" x 36" Universal Jaw Crusher
1—11" x 18" Universal Jaw Crusher
1—24" x 13" Farrell Jaw Crusher
1—10" x 16" Hercules Jaw Crusher
1—10" x 16" Universal #3M Jaw Crusher
1—20" x 36" Austin-Western Jaw Crusher
1—36" x 48" Jeffrey Flextooth Crusher
1—26" x 18" Williams Hammermill
1—30" x 17" Williams Hammermill

CONCENTRATING TABLES

1—#12 New Wilfley Half Size Table
1—#6 Wilfley Table
6—Deister Plat-O Tables

Send for Catalog 521E

MORSE BROS. MACHINERY COMPANY

2900 Brighton Blvd. P.O. Box 1708 Keystone 5261 DENVER, COLORADO

FOR QUICK, DEPENDABLE

COMPRESSOR

SERVICE

AMERICAN AIR of JERSEY

GAS • DIESEL • STEAM • ELECTRIC

SELL—BUY—TRADE—RENT—REPAIR

A RENTAL COMPRESSOR FOR EVERY JOB

55 CFM Lindsay (GAS) Portable
60 CFM Worthington (GAS) Portable
70 CFM Smith (GAS) Portable
89 CFM 6 x 7 Worthington HB, 15 HP Elec
105 CFM Worth-IR-CPT Portable
107 CFM 7-7 x 7 Ingersoll FS-1 STEAM
129 CFM 7½ x 7 American AF-1, 20 HP
142 CFM Ingersoll Semi-Portable 25 HP
160 CFM IR-Worth Portable
165 CFM Smith 110SR Semi-Portable, 25 HP
195 CFM 8-9 x 9 Worthington HS STEAM
210 CFM Worthington (GAS or DIESEL) Port
211 CFM 9 x 9 Worthington HB, 40 HP Elec
279 CFM 11-10 x 11 Worthington HS STEAM
294 CFM 10 x 12 Worthington HB, 50 HP
315 CFM Worthington (GAS or DIESEL) Port
387 CFM Gardner Semi-Portable 75 HP
445 CFM Gardner Semi-Portable 100 HP
462 CFM 12-14½x13 American AF-S STEAM
500 CFM Worthington (DIESEL) Portable
538 CFM Worthington Semi-Portable, 100 HP
600 CFM Worthington (DIESEL) Portable
628 CFM 14 x 13 Ingersoll ES-1, 100 HP

MANY OTHERS TO CHOOSE FROM

GUARANTEED PERFORMANCE

COMPRESSORS SINCE 1902

American
AIR COMPRESSOR CORP.
47th ST. & DELL AVE. NORTH BERGEN, N. J.
Telephone UNion 5-4848

PIPE

SURPLUS NEW and USED FOR SALE

Write for Free Brochure on:

- Piling
- Pile Shells
- Pile Fittings
- Prefabricated Piping
- SPEED-LAY System

ALBERT pipe supply co., inc.
BERRY AT NORTH 13TH ST. • BROOKLYN 11, N. Y.

5 SURPLUS MERRICK E WEIGHTOMETERS
For 18", 24", 30", 36" & 42" Belts
CRUSHERS
JAW: 48x60, 42x48, 30x36, 24x36, & 30x42
SINGLE ROLL: 36x60 Fairmount
REDUCTION: 1'8" & 3' TRAYLOR TY
GRINDING MILLS
TUBE MILLS: 5'x18', 5'x22', 5½'x20' & 6'x22'
BALL MILLS: 5x4, 6x6, 6x12, 7x8 & 9½x11
HARDINGE: 5'x22', 6'x22", 8'x22", 10'x36" & 10'x48"
ROD MILLS: 4'x7', 5'x14', 3'x10' & 6'x12'
CLASSIFIERS & THICKENERS, ETC.
DINGS MAGNETIC: Type 1-R—3 STAGE—60"
DORR 40' D.x30'—3 TRAY, 4 COMP. THICKENER
STANDARD THICKENERS: 12' to 100' dia.
DORR CLASSIFIERS: 3'x25'x10' Turret Bowl
6x22 DSF, 2x15 SSFR
54", 60" x 78" Wemco Spirals
12'x10' DORRCO DRUM FILTER
8 DISC 8'6" AMERICAN AND OTHER FILTERS
AIR COMPRESSORS
9 Electric 5,000, 3,865, 3,178, 2,200, 1,578 & 1,302, 1,090, 676 & 500 Ft.
6 Diesel 1,578, 1,000, 676 & 500 FT.
LOCOMOTIVES
8 Goodman 4 ton — 8 ton Battery Locomotives.
12 Diesel 100, 80, 65, 45, 30, 20 Ton Locomotives.
22 Gas. 35, 25, 16, 12, 8 & 6 Ton Locomotives.
7 4 ton, 6 ton, 13 ton Trolley.
R. R. CARS
100 Dump Cars, 2, 4, 12, 20 and 30 yd.
100—60 Ton Flat Cars. 66—50 Ton Gondolas.
150—8,000 & 10,000 Gal. Cap. Tank Cars.
TUNNEL MUCKERS — LOADERS
4 Gardner Denver GD9 & GD14.
10 Eimco 40 & 12B & 21. 4 Sullivan HL20.
CRANES
30 Ton Ind. B.H. 70 Ft. Boom Loco. Crane, Gas.
3—802 & 1201 Lima Comb. Cranes & Draglines.
SECTIONAL FRAME CRUSHERS
2 Buchanan MODEL C 30 x 42
MISCELLANEOUS
Rotary Dryers: 4x20, 4'x40', 6'x40' & 6'x80'.
Kilns: 4'x28', 6'x60', 6'x80', 8'x72' & 8'x125'.
Mine Hoists: 75, 200, 300, 400, 600 & 1300 H.P.
40—10,000 Gal. R.R. Car Tanks.
Hercules Junior 3 Roll Pulverizer.
36x24 Jeffrey B2 Pulverizer & 36x36 B-3.
7—20,000 Gal. Steel Storage Tanks.

R. C. STANHOPE, INC.
60 E. 42nd St., New York 17, N. Y.

Used Equipment for sale by owner:

2—Filters, 14' x 18' Dorrco drum type
2—Hydroseparators, 60" x 45'
1—100' Thickener, Dorr Company
8—Banks flotation cells
2—78" x 28'6" Wemco Classifiers
4—54" x 34' Aikens Classifiers
2—5' x 45' Calcine Coolers
1—22' x 48' Herreschoff Furnace
1—Kohler Miners Lamp outfit, 64 lamps with rectifiers and batteries
1—5" Viking gasoline powered pump
6—3" Bingham slurry pumps, rubber lined
16—4" Bingham slurry pumps, rubber lined
1—6" Dorr vertical duplex pump
1—6" Denver Simplex diaphragm pump
4—Stearns Rogers reagent feeders
4—Geary reagent feeders
1—I. R. type IR-34 drill bit sharpener
3—Sutorbilt blowers, 2000 C.F.M.
2—4 x 6 Allis-Chalmers screens S. D. Utah type
4—Richardson feed and weigh scales
3—Portable compressors 315-K210-K500
1—Gardner Denver 125# W.P. compressor with 150 H.P., 2200 volt motor
16—Agitator Motorized Reducers 5 H.P.
(Above items located in Nevada)
1—12' diameter x 10' long Dorrco drum type filter (Located in Ohio)

for further information contact J. H. Clements in care of Basic Refractories, Inc., Maple Grove, Ohio.

At Your Service

— for bringing business needs or "opportunities" to the attention of men associated in executive, management, sales and responsible technical, engineering and operating capacities with the industries served by the following McGraw-Hill publications:

The SEARCHLIGHT SECTIONS of

(Classified Advertising)

American Machinist
Aviation Week
Business Week
Bus Transportation
Chemical Engineering
Chemical Week
Coal Age
Construction Methods & Equipment
Electrical Construction & Maintenance
Electrical Merchandising
Electrical Wholesaling
Electrical World
Electronics
Engineering and Mining Journal
E. & M. J. Metals & Mineral Markets
Engineering News-Record
Factory Management and Maintenance
Fleet Owner
Food Engineering
National Petroleum News
Nucleonics
Petroleum Processing
Power
Product Engineering
Textile World
Welding Engineer

For advertising rates or other information address the

Classified Advertising Division

McGRAW-HILL PUBLICATIONS CO., Inc.
330 West 42nd Street
New York 36, N. Y.

ELECTRICAL WIRE AND CABLE

YOUR BEST SOURCE . . .

- for every industrial and power application
- odd lengths—long and short—reasonably priced
- largest stock in Midwest
- varnished cambric—leaded—neoprene

Let us quote on requirements—send your inquiries

DELIVERY

QUICK . . . from stock

We'll also buy your Surplus

Branch Offices:
Houston—Yukon 5547
Los Angeles—DUnkirk 7-3285

UNIVERSAL Wire and Cable Co.
2864 N. Clybourn Ave., Chicago 14, Ill.
EAstgate 7-4777 Code: UNIWIRE

1—800, 1100 & 1500 Barrel Cement Plants—Complete lime hydrating plant
Rotary Dryers—4' x 30', 6' x 40', 5' x 50'.
Tube & Ball Mills—5' x 22'—5½' x 20'.
6' x 100'—7' x 120' & 8' x 120' Kilns.
Jaw Crushers—From 10" x 6" up to 48" x 60".
Crushing Rolls—From 12" x 24" up to 54" x 24".
Sturtevant Rotary fine crushers—No. 0—No. 2—7 x 8'—6 x 12 & 8 x 6 Ball Mills.
1—6' x 22" & 5' x 22" Harding Ball Mill.
Ring Roll Mills—Sturtevant No. 1—No. 2 duplex.
5'—16' & 18' Hereschoff furnaces.
Gyratory crushers, No. 3 to No. 12.
222—322 & 236 Allis-Chalmers Hydrocone Crushers
Magnetic separators—Jigs—screens—classifiers, thickeners, air separators & filters.
5'—6' & 7' dia. Rod Mills.
New Dryers—Kilns. Dust Collectors & Slime Hydrators.
6"—10"—14"—16" McCully Superior gyratory crushers.

W. P. Heineken, Inc.
50 Broad Street, New York

RELAYING RAIL

All Sizes
Track Accessories
LEFTON INDUSTRIAL CORP.
***Genl. Office:* 212 Victor St.**
St. Louis 4, Mo.

MOTOR GENERATOR SETS

1—600 KW GE Syn. 275 V. DC, 900 RPM
2—300 KW GE Syn. 275 V. DC, 1200 RPM
2—300 KW WEST. Syn. 275 V. DC, 1200 RPM
2—200 KW GE Syn. 275 V. DC, 1200 RPM
2—150 KW GE Syn. 275 V. DC, 1200 RPM

LOCOMOTIVES

1—13 T JEFFREY 250 V. MH-110 32-44" Ga.
2—10 T JEFFREY 250 V. MH-110 32-48" Ga.
1— 8 T WEST. 250 V. ML-925-LK 24-28½"
2— 8 T WEST. 250 V. ML-905-C 24-36" Ga.
2— 8 T JEFFREY 250 V. MH-100 32-36" Ga.
1— 5 T WEST. 250 V. ML-903-C 24-36" Ga.
2— 4 T GE 250 V. HM-825-A 30-36" Ga.
2— 4 T WEST. 250 V. ML-901-C 18-44" Ga.

WALLACE E. KIRK COMPANY
505 Grant Building, Pittsburgh 19, Penna.

JACKBITS — FOR SALE

Timken Type "H", "M" and "D" — Ingersoll-Rand Type "0", "1" and "2", side and center hole, all sizes. Less than distributors buying price. Packed for export if required.

JULIUS M. FOGELMAN
1649 Perkiomen Ave., Reading, Penna.

MACHINERY

Mill: 5x10 ft. Marcy; 150 hp. motor.
Mill: #64½ Marcy; new liners; with 100 hp 440-v syn. motor, etc.
Filter: 6x6 Eimco w/vacuum eq.

Bob Barrett
P.O. Box 2804 — Tucson, Arizona

FOR SALE

1—8 ft. x 12 ft. Marcy Rod Mill, center peripheral discharge with 350 HP Synchronous Motor with control panel.
1—360 HP Fairbanks Morse Diesel Engine with direct-connected generator.

H. T. NEAL MACHINERY COMPANY
57 Post St., San Francisco GArfield 1-1016

DIESEL ENGINES • GENERATOR SETS

10 TO 2000 KW • AC & DC • GUARANTEED
"We Own What We Offer"
A.G. SCHOONMAKER CO., INC.
50 CHURCH ST. NEW YORK 7, N.Y.
Plants: SAUSALITO (S. F.) CAL., JERSEY CITY, N. J.

EQUIPMENT

LATEST TYPE METALLURGICAL AND CHEMICAL EQUIPMENT

• Excellent Condition

Hardinge Conical Ball Mill 10′ x 48″
Oliver All Iron Rotary Vacuum Filters
Buflovak Twin Drum Dryer
Dorr Type A Thickeners
Allis-Chalmers type 222 Gyratory Crusher
Link Belt Screw & Belt Conveyors
Norblo & Sly Dust Collectors
Dorr, Morris, Worthington process pumps
Research Corp. Electrostatic Precipitator

The above items include all auxiliary equipment with individual motor and control 220/440/3/60. The equipment may be inspected on foundations.

Complete List with Specifications Available.

THE VULCAN DETINNING CO.

SEWAREN, N. J.

FLUID DRIVE · GYROL TYPE VS

● HYDRAULIC COUPLINGS ●

Stepless speed variation with constant speed prime mover made by American Blower Co. Ideal for pumping stations, steel mill drives, mechanical draft fans, crushers, rotary kilns, etc.

Wide range of capacities—Condition 98% new
200 HP to 2500 HP input
300 RPM to 900 RPM input

Complete data & quotation on request. Also large selection of marine couplings, reduction gears, & Falk grid type couplings in stock.

A.G. SCHOONMAKER CO., INC.
50 Church St. New York 7, N. Y.

LOCOMOTIVES: 2—65 ton diesel electric, standard R.R. gauge, thoroughly modern, excellent condition. For sale or rent.

LOCOMOTIVE CRANE: Link Belt 25 ton capacity, standard R.R. gauge, gasoline powered, cast steel trucks, air brakes, with or without 1¼ yd. Williams clam shell bucket, thoroughly modern, excellent condition, located Minnesota.

COMPRESSORS: Ingersoll Rand type XRE, 225 H.P. synchronous motor, 2200 volt, 300 RPM, with intercooler, aftercooler, air receiver, silencer, etc., completely automatic, new 1950. One same as above 125 H.P., 500 CFM.

MINE HOISTS: Single and double drum 100 to 1500 H.P. with all electrical equipment. Complete specifications, drawings and photos available.

MINE HOIST SPECIAL: Nordberg 1200 H.P., 1400 FPM, one drum clutched, wraps 1100 ft. 1¾" rope in one wrap, complete with motor and all auxiliary equipment.

CLASSIFIERS: 4—Akins 54" x 34 ft. with lifting device, 220/440 volt motors. 2—Wemco 78" Simplex single screw, double pitch, 28½ ft. tank, 220/440 volt motors. All in condition like NEW. 1—Wemco Duplex size 72" x 32 ft., type SH, pitch double and variable, with lifting device, 220/440 volt motor. NEW and UNUSED. Three located Nevada.

JAW CRUSHERS: Telsmith 18" x 32", all steel, roller bearing, NEW condition, with or without 50 H.P. motor, 440 volt, V-belt drive. Also others 12" x 15" to 48" x 60".

WE BUY AND SELL EQUIPMENT THROUGHOUT NORTH AND CENTRAL AMERICA

A. J. O'NEILL
Lansdowne, Pa.
Phila. Phones: MAdison 3-8300—3-8301

WORLD'S LARGEST INVENTORY

FREE CATALOG

MOTORS-GENERATORS-TRANSFORMERS
New and Guaranteed Rebuilt
1 H.P. to 2500 H.P.

ELECTRIC EQUIPMENT CO.
P. O. BOX 51, ROCHESTER 1, N.Y.

NOW LIQUIDATING!!

At Bargain Prices

St. Louis, Rocky Mountain and Pacific Co.

Brilliant Mine at Raton, New Mexico

Motor Generator Sets and Motors:

1—WESTINGHOUSE—900 RPM—720 HP Synchronous Motor 2200 Volt AC—60 Cycle—Direct Connected to a 500 KW DC Generator—600 Volt—833 Amps. Serial #Motor 2275993—Generator #2275991—W/controls

2—WESTINGHOUSE—900 RPM—450 HP Synchronous Motor 2200 Volt AC—60 cycle—Direct Connected to a 300 KW DC generator—550 Volt—545 Amps. Serial #Motor 1550113/112—Generators #1550116/117

1—WESTINGHOUSE—625 RPM—200 HP Synchronous Motor 2200 Volt AC—60 cycle—Direct Connected to a 175 KW DC Generator—550 Volt—(4 bearing set) #Motor 1354036—W/controls

1—WESTINGHOUSE—900 RPM—290 HP Induction Motor 2200 Volt AC—60 cycle—Direct Connected to a 200 KW DC generator—550 Volt—364 Amps. Type SK Serial #Motor 1354046—Generator #1354048—Control

Rail:

300 Tons—60# ASCE Relaying Rail
300 Tons—56# ASCE Relaying Rail
150 Tons—52# and 40# Relaying Rail

Locomotives:

2—WESTINGHOUSE—Battery Locomotives—6 ton 40" Ga. (42" Gauge)—Permissable Type w/Edison Batteries and changing equipment—Late type.

1—WESTINGHOUSE—Trolley Locomotive—15 ton 40" Ga. (42" Gauge)—Haulage type.

1—WESTINGHOUSE—Trolley Locomotive—20 Ton 40" Ga. (42" Gauge)—Haulage type.

Washing Plant

1—JEFFREY MFG. CO.—Coal Washing Plant—60" Diaphragm 50 Ton per hour capacity—complete unit still intact including building, motors, etc. — Practically brand new — 7 years old.

All Steel Tipples

2—ALL STEEL COAL TIPPLES, and their appurtenances, including, shakers, conveyors, pit car scales, etc.

Miscellaneous:

Jeffrey 5 and 6 foot adjustable pitch fans, electric motors, transformers, 36" x 36" Single Roll Crusher, All steel pit cars, I beams, Pipe, wire, pumps, hoists, and many items too numerous to mention.

MAY WE HAVE YOUR INQUIRIES? PHONE, WIRE OR WRITE.

"Everything Must Be Sold Regardless of Price"

STANDARD IRON AND METAL CO.

Simco Division

1564 South 2nd West St.
P. O. Box 2125
Salt Lake City, Utah

585 Walnut Street
Denver 4, Colorado

1—2100 HP NORDBERG DOUBLE DRUM MINE HOIST, First Motion, 2400 F.P.M. Rope Speed, Direct Connected Direct Current Motor Drive with Ward-Leonard Control. 3 Phase, 60 Cycle, 2300 Volt Synchronous Motor Driven D.C. Generator. All Accessory Equipment and Safety Controls.

1—850 HP NORDBERG SINGLE DRUM MINE HOIST, First Motion, 1400 F.P.M. Rope Speed, Direct Connected Direct Current Motor with 3 Phase, 60 Cycle, 2300 Volt Synchronous Motor Driven D.C. Generator—All Accessory Equipment.

1—4′ Symons Short Head Cone Crusher
1—10 x 20 Traylor Jaw Crusher
3—8′ x 36″ Hardinge Conical Ball Mills
2—8′ x 26″ Hardinge Conical Regrind Mills
1—6′ x 22″ Hardinge Conical Ball Mill
1—8 x 10 Oliver Drum Filter
2—8 x 6 Oliver Drum Filters
1—4 x 6 Oliver Drum Filter
2—3 x 10 Allis-Chalmers 2 Deck Lo-Head Screens

FOLLOWING TWO AND THREE DRUM 3/60/440 ELECTRIC SLUSHER HOISTS

1—Ingersoll-Rand 50 HP 3 Drum MNM-4D 6600# @ 250 FPM
1—Joy 50 HP 3 Drum C-312 5500# @ 300 FPM
1—Ingersoll-Rand 30 HP 3 Drum
1—Ingersoll-Rand 15 HP 3 Drum
4—Joy (Sullivan) 15 HP 2 Drum A-211

MILLER MACHINERY CO.
BOX 1496 **PHONE 9-2309**
MISSOULA, MONTANA

FOR SALE

2—Sutton, Type ORE, Model B-100 Air-float Separators
1—1000# Dillon-Box Tugger Air Hoist
1—20" x 7 Vac. Receiver with fittings
1—30" x 48" Baker Regrind Ball Mill
1—50 Ton Truck Scale—Steel Stringers
1—4¼ x 5, Six Cyl. Wisc. Gas Power Unit
1—14" x 50′ long conveyor—Steel Frame
1—3" Wilfley Sand Pump
1—12" x 5" Denver Batch Ball Mill
1—3" Dorrco Duplex Diaphragm Pump
1—6½′ dia. x 5′ high Conditioner—Steel Tank
1—18" dia. x 26" Face Dings Mag. Pulley, with Mech., Belt & Charger
2—Adams Wet Reagent Feeders.

Write for Stock List No. 12

Florence Machinery & Supply Co.
904 Equitable Bldg., Denver 2, Colo.

36-42-60 IN. NEW BELT CONVEYOR EQUIPMENT IN STOCK

5000 — CONVEYOR CO. BALL BEARING 6 In. and 5 In. dia. Idlers Troughing Type 60 In. $35. ea.; 42 In. $20. ea.; 36 In. $18.50 ea. Return Type 60 In. $15. ea.; 42 In. $11.50 ea.; 36 In. $11 ea. Also 3 complete terminals and drives. 5000 ft. 36 In. & 42 In. Belt.

35 COMPLETE NEW TERMINALS FOR ABOVE AT VERY LOW PRICES.

DARIEN CORP., 60 E. 42nd St., New York 17, N. Y. • MU-2-0042

ALPHABETICAL INDEX TO ADVERTISERS

(This index is published as a convenience to the reader. Every care is taken to make it accurate, but E&MJ assumes no responsibility for errors or omissions.)

Aero Service Corp. 24, 25
Allen-Sherman-Hoff Pump Co. ..... Second Cover
Allis-Chalmers Mfg. Co. (General Machinery) 10, 11, 38, 58
Allis-Chalmers (Tractor Div.) 12, 13, 55
Allison Div. General Motors 170
American Brattice Cloth Corp. 190
American Chain & Cable (Hazard Wire Rope Div.) 52
American Cyanamid Co. Insert between pp. 142–143
American Hoist & Derrick Co. 196
American Manganese Steel Div. American Brake Shoe Co. 42
American Steel & Wire Div. 20
American Wheelabrator & Equipment Corp. 203
Armour Chem. Div. Armour & Co. 187
Armstrong-Bray & Co. 192
Athey Products Corp. 211
Atlas Car & Mfg. Co. 64

Baker & Adamson Products, General Chemical Div., Allied Chemical & Dye Corp. 158
Baldwin-Lima-Hamilton Corp. (Construction Equipment Div.) 134
Barber-Greene Co. 192
Bemis Bro. Bag Co. 169
Bethlehem Steel Co. 58B, 201
Birdsboro Steel Fdry. & Machine Co. 159
Bonnot Co. 142
Booth Engineers 204
Brunner & Lay Inc. 171
Bucyrus-Erie Co. 198
Buell Engineering Co. 146
Builders-Providence Inc. 188

Card Iron Works Co., C. S. 126
Caterpillar Tractor Co. Insert between pp. 110–111
Chicago Pneumatic Tool Co. 209
Clark Equipment Co. 179
Cleveland Wire Cloth & Mfg. Co. 172
Colorado Fuel & Iron Corp. 152
Colorado Iron Works Co. 58A
Columbia-Geneva Steel Div. 20, 53
Commercial Shearing & Stamping Co. 112
Continental Gin Co. 130
Copco-Pacific Ltd. 132
Coppus Engineering Corp. 33
Crane Co. 50
Crucible Steel Co. of America 34

Dart Trucks 197
Denver Equipment Co. 45
Detroit Diesel Engine Div. General Motors 139
Dings Magnetic Separator Co. 168
Dodge Mfg. Corp. 46, 47
Dorr Co. 103, 119
Dow Chemical Co. 133
du Pont de Nemours & Co., Inc. (Explosives Dept.) 59
Dwight-Lloyd, Inc. 200

Edison Storage Battery Div. Thomas A. Edison, Inc. 164
Eimco Corp. 62, 111
Electric Storage Battery Co. 181
Electro Dynamic Div. of General Dynamics Corp. 131
Engineering & Mining Journal 182, 183
Engineers Syndicate, Ltd. 178
Ensign-Bickford Co. 54
Ensign Electric Co. 188
Euclid Div. General Motors Corp. 57

Falk Corp. 143
Farris Flexible Valve Corp. 193
Farval Corp. 135
Flexible Steel Lacing Co. 108

Galigher Co. 49
Gardner-Denver Co. 51
Gates Rubber Co. 60
General Cable Corp. 14
General Electric Co. (Apparatus Div.) 18, 19, Insert between pp. 50–51
General Refractories Co. 151
Georgia Iron Works 138
Godoy & Co., Inc., E. A. 150
Goodrich Co., B. F. 5
Goodrich Co., B. F. (Tire & Equip. Div.) 63
Goodyear Tire & Rubber Co. 21
Greensburg Machine Co. 172
Grinnell Co., Inc. 141

Hardinge Co., Inc. 154, 155
Harnischfeger Corp. ..... Third Cover
Hayes Steel Products, Ltd. 150
Hendrick Mfg. Co. 200
Hewitt-Robins, Inc. 116, 117
Hough Co., Frank G. 65

Industrial Brownhoist Corp. 199
Industrial Diamond Assoc. of America, Inc. 204
Ingersoll-Rand Co. 3
International Harvester Co. 125
International Nickel Co., Inc. 207

Jeffrey Mfg. Co. 153
Johnson Co., C. A. 16, 17
Joy Mfg. Co. 8, 9, 61

Kaiser Engineers Div. Henry J. Kaiser Co. 39
Kennedy-Van Saun Mfg. & Engrg. Corp. 107
Klockner-Humboldt Duetz, A. G. 217
Koehring Co. 16, 17

Laughlin Co., Thomas 174
LeRoi Co. Cleveland Rock Drill Div. 26, 27, 163
Leschen Wire Rope Div. sub. H. K. Porter Co., Inc. 109
LeTourneau-Westinghouse Co. 22, 23, 115
Link-Belt Co. 50A

Mace Co. 169
Mack Trucks 184
MacWhyte Co. 147
Manhattan Rubber Div. 149
Manitowoc Engineering Corp. 202
McKee & Co., Arthur G. 40
Merrick Scale Mfg. Co. 180
Midvale Co. 142A
Mine & Smelter Supply Co. 56
Mine Safety Appliances Co. 157

National Filter Media Corp. 124
Naylor Pipe Co. 114
New York Engineering Co. 204
Nordberg Mfg. Co. 37
Northern Blower Co. 148
Northwest Engineering Co. 15

Ohio Brass Co. 145
Osmose Wood Preserving Co. of America 160

Parsons Co. 16, 17
Patterson Fdry. & Machine Co. 185
Patterson Fdry. & Machine Co. (Canada Ltd.) 185
Pennsylvania Drilling Co. 204
Philadelphia Quartz Co. 180
Pittsburgh Lectromelt Furnace Corp. 175
Precision Radiation Instruments 171
Pressed Steel Car Co., Inc. 194
Punch-Lok Co. 177

Quaker Rubber Corp. Div. H. K. Porter Co., Inc. 144

Raybestos-Manhattan, Inc. 149
Roebling's Sons Corp., J. A. 113
Roots-Connersville Blower Div. of Dresser Industries, Inc. 166
Rust-Oleum Corp. 43
Ryerson & Sons, Inc., J. T. 105

Salem Tool Co. 178
Sanford-Day Iron Works 44
Sauerman Bros., Inc. 162
Scandinavia Belting Co. 191
Searchlight Section 212–215
Sheffield Steel Corp. 205
Sight Feed Generator Co. 180
Simplex Wire & Cable Co. 31
Smit & Sons, Inc., J. K. 140
Spang & Co. 156
Sprague & Henwood, Inc. 196
Standard Oil Co. of Calif. 127
Stearns Magnetic, Inc. 189
Stein, Hall & Co., Inc. 173
Stephens-Adamson Mfg. Co. 136, 137
Straub Mfg. Co. 206
Sturtevant Mill Co. 30

Tennant, Sons & Co., C. 186
Tennessee Coal & Iron Div. 20, 53
Texas Co. 6, 7
Texas Gulf Sulphur Co. 32
Texas Instruments, Inc. 161
Thermoid Co. 176
Thew Shovel Co. 218
Thomas Flexible Coupling Co. 122
Thompson Products, Ltd. 206
Timken-Detroit Axle Div. Rockwell Spring & Axle Co. 28, 29
Timken Roller Bearing Co. ..... Fourth Cover
Tinney Drilling Co. 186
Traylor Engrg. & Mfg. Co. 48

United States Rubber Co. 167
United States Steel Corp. 20, 53
United States Steel Export Co. 20, 53

Victaulic Co. of America 128
Vulcan Iron Works 165

Walworth Co. 50B
Wedge-Wire Corp. 186
Western Machinery Co. 129
Western Precipitation Corp. 195
Westinghouse Electric Corp. Insert between pp. 58–59
Wheel Trueing Tool Co. 123
Wilfley & Sons Co., A. R. 66
Wild Surveying Instruments Supply Co., Henry 41

Yuba Mfg. Co. 138

PROFESSIONAL SERVICES 210

SEARCHLIGHT SECTION

(Classified Advertising)

H. E. Hilty, Mgr.

EMPLOYMENT
Positions Vacant 212
Positions Wanted 212

SPECIAL SERVICES 212

BUSINESS OPPORTUNITIES
Offered 212

EQUIPMENT
(Used or Surplus New)
For Sale 213–215

WANTED
Equipment 212

ADVERTISERS INDEX

Albert Pipe Supply Co., Inc. 213
Americaa Air Compressor Corp. 213
Barrett, Bob 214
Basic Refractories 214
Darien Corp. 215
Dean, Frank 212
Electric Equipment Co. 215
Florence Machy. & Supply Co. 215
Fogelman, Julius M. 214
Heineken, Inc., W. P. 214
Kiek Co., Wallace E. 214
Lefton Industrial Co. 214
Miller Machinery Co., Inc. 215
Morse Bros. Machinery Co. 213
Neal Machinery Co., H. T. 214
O'Neill, A. J. 215
Schoonmaker & Co., A. G. 214, 215
Southern Manufacturers & Distributors, Inc. 212
Stanhope, Inc., R. C. 214
Standard Iron & Metal 215
Universal Wire & Cable Co. 214
Vulcan Detinning Co., The 215
Wilms, Wolf 212

SINCE 1856
HUMBOLDT
Mines Equipment, Mineral Dressing Plants, Crushing and Grinding Machinery, Cement Factories, Metallurgical Works, Coal Preparation Plants, Steel Constructions for Buildings and Bridges.
SINCE 1864
DEUTZ
Otto-, Gas-, Diesel-Engines for Every Purpose of Two- and Four-Stroke design, Output range 3-1650 H.P. Cooled by water or air, Diesel-powered tractors, Diesel locomotives, Gas producer plants.
SINCE 1864
MAGIRUS
Trucks and busses driven by air-cooled DEUTZ Diesel engines, Vehicles for municipal services, Fire ladders, fire engines, Fire fighting water trucks, Two-wheeled ladders, Fire fighting equipment.
KLÖCKNER-HUMBOLDT-DEUTZ AG · KÖLN

Send inquiries to either Köln, Germany or Ulm, Germany

Mt. Perry Coal Co. uses LORAIN SCOOP SHOVEL method to skim 6″ to 10″ coal seam from clay base

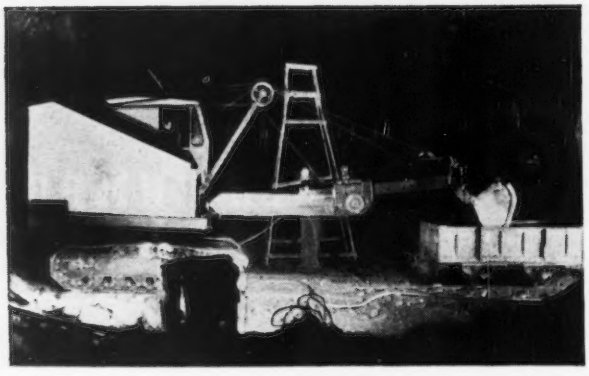
There was a day, at the Mt. Perry Coal Co. operation, Coshocton, Ohio, when valuable coal seams went to waste. There was a 6″ to 10″ second seam of coal that laid below the primary 30 inch coal seam, and separated from it by a layer of fire clay 1″ to 2″ deep. In the past, they were unable to get the second seam of coal because they had no equipment that would skim a thin layer without digging up considerable amounts of underlying fire clay with the coal.

Then, the Lorain Scoop Shovel method was discovered! With this efficient tool, they crowd the bucket with a horizontal thrust and peel off the 6″ to 10″ of coal without disturbing the ground below.

While this Scoop Shovel application is in coal, it is just as adaptable to any mining operation, to thick or thin deposits, in pits or underground . . . wherever level floor clean-up, or low headroom operations are necessary. Ideal, too, for loading or stockpiling of bulk material. See your nearest Lorain distributor — *or write for Scoop Shovel bulletin today!*

SCOOP SHOVEL works underground at Dominion Wabana Ore, Ltd.

Because of the horizontal crowding action that extends the Scoop Shovel bucket over a wide radius, enabling "clean floor" operation with few moves, and the low headroom requirements, the Lorain Scoop Shovel also is ideal for underground mining operations. Below, a Lorain Scoop Shovel is shown loading iron ore at Bell Isle, Newfoundland, for Dominion Wabana Ore, Ltd.



THE THEW LORAIN®

THE THEW SHOVEL CO.
LORAIN, OHIO

ROCK RATED!

for the hardest years ahead

Your profits depend on the strength and speed of loading equipment — and P&H gives you more of *both*.

P&H *greater strength* comes from welded alloy steels — the toughest construction known. No wonder P&H can take pounding and shock loads that K.O. less rugged machines.

P&H *greater speed* comes from Magnetorque* Electric Swing — actually 15% to 25% faster than any other machine of its size to give you greater production, lower tonnage costs. And it's goodbye to maintenance and replacement problems for years to come . . . Magnetorque lasts the life of your P&H.

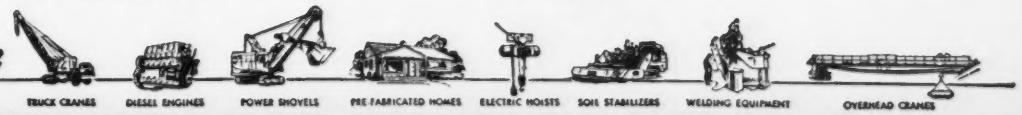
But to get fully acquainted with this outstanding producer, let us direct you to a 955-A in action. If you want bigger capacity, same advanced design, ask about the P&H 1055-A (3½ yd.)

P&H MAGNETORQUE

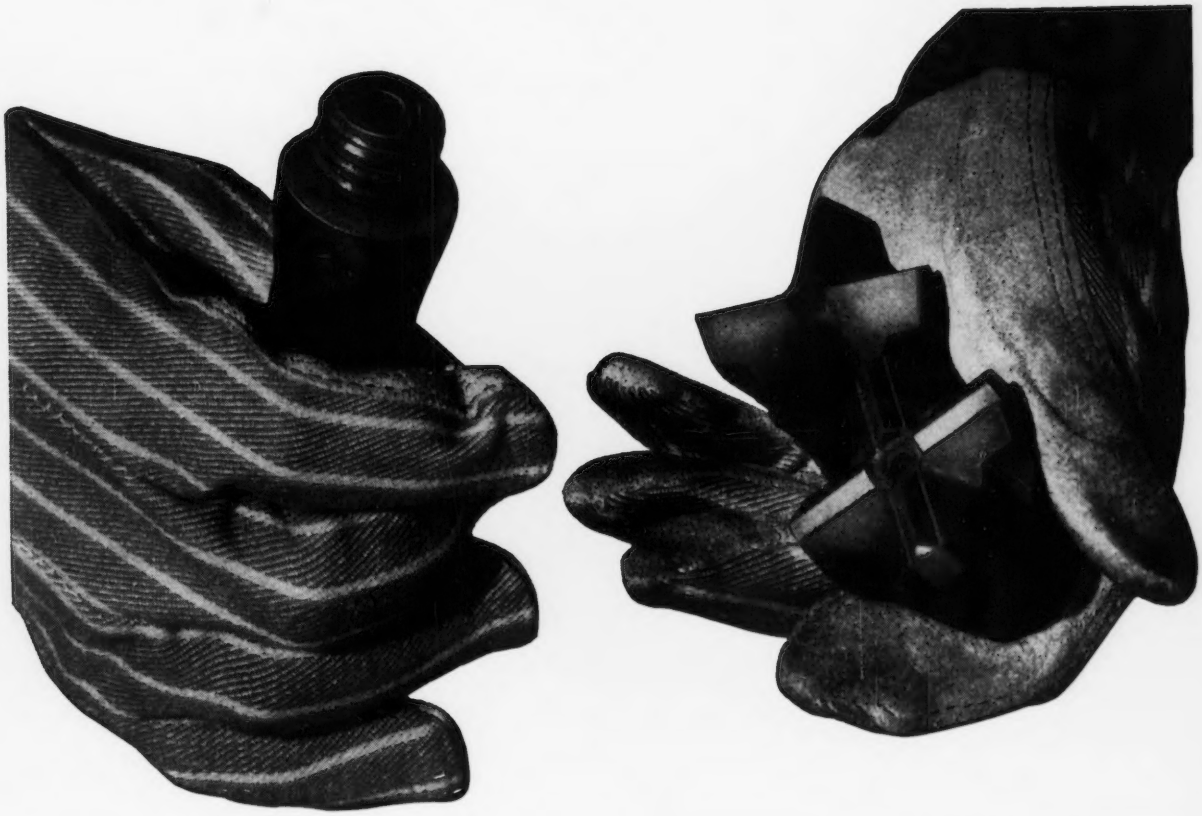
*T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

P&H LARGE EXCAVATOR DIVISION
HARNISCHFEGER CORPORATION
• MILWAUKEE 46, WISCONSIN

the P&H Line



WHY WASTE TIME CHANGING STEELS WHEN YOU CHANGE BIT TYPES?



Dozens of different Timken® multi-use and carbide insert bits fit the same drill steel!

DO your men have to waste time going after a different set of drill steels every time a different type bit is needed? If so, you can save valuable drilling time by using Timken® interchangeable rock bits. Because dozens of different Timken multi-use and carbide insert bits fit the *same* drill steel, you can change bit types in less than one minute. That's all it takes to unscrew one Timken rock bit and screw on a different type.

You reduce costs further because you can cut your drill steel inventory. And your drillers can always switch to the most economical bit as the ground changes—right on the job!

Both Timken multi-use and carbide insert bits are made from electric furnace Timken fine alloy steel, have special shoulder unions that keep drilling impact from damaging threads.

Our rock bit engineers will be glad to run a test in your mine to determine the rock bits best suited to solve your particular drilling problems. There's no obligation. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

WHERE YOU CUT COSTS WITH TIMKEN MULTI-USE BITS

Most economical for rock of average hardness. With correct and controlled reconditioning, they give lowest cost per foot of hole when full increments of steel can be drilled.

WHERE YOU CUT COSTS WITH TIMKEN CARBIDE INSERT BITS

Give highest speed through hardest, abrasive rock. Also most economical for constant-gage holes, small diameter holes, very deep holes.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

... your best bet for the best bit ... for every job